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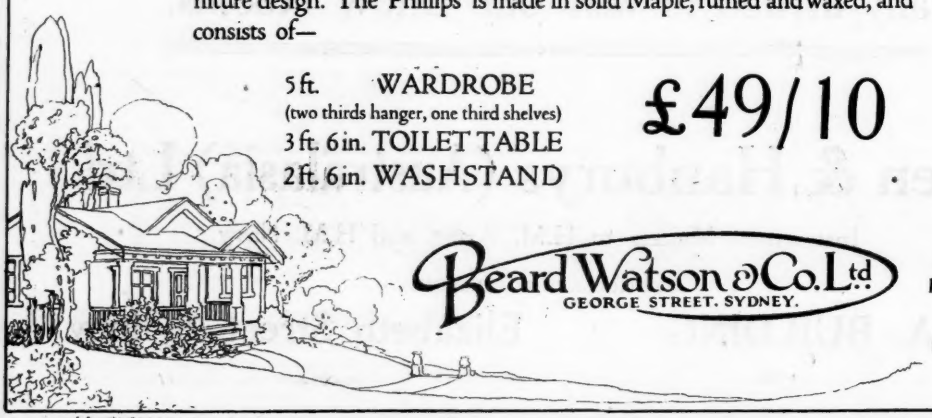

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INDUSTRIAL HYGIENE AS APPLIED TO MUNITION WORKERS.[1]

By **Ethel E. Osborne, M.Sc.,**
Melbourne.

LAST year I returned to Melbourne from England, where I had been engaged for nearly two years under the Ministry of Munitions of War in factories in which large numbers of women were employed on work of very varying degrees of skill and requiring very varying degrees of physical exertion. At first my work consisted of night welfare work, the duties of which bring the conscientious worker into the closest touch with the women employed. Afterwards I was at different times Head Supervisor in National Ordnance Factories, where 900 and 2,700 girls were employed. The duties of such posts entail entire charge of all the women in every respect, other than actual technical work. Later I was engaged entirely on investigations concerning the health, welfare, efficiency and output of women munition workers under the Health of Munition Workers Committee, whose Final Report was issued at the end of 1918, under the Medical Research Committee of the National Health Insurance and as investigator for the newly-formed Industrial Fatigue Research Board, which has been established as a permanent organization "to consider and investigate the relations of the hours of labour and of other conditions of employment, including methods of work, to the production of industrial fatigue, having regard both to industrial efficiency and to the preservation of health among the workers."

A new basis has been fixed on which all industry must be founded; that is the true appreciation of the position of the worker in production. A war of destruction, the wholesale slaughter of millions of the ablest men has been the means of placing the true valuation on labour in industry.

Before the war in England unemployment was common. Practically every large town had its list of unemployed men, out-of-work, ready to take any casual job which might offer. I might quote an instance which impressed me very forcibly by contrast afterwards. In the winter of 1911 I was in England and one night there was a heavy, unexpected snow-storm. By 9 a.m. next morning, in a town the size of Melbourne, the council had drawn on the supply of unemployed and had no less than 900 able-bodied men clearing away snow from the roads and pavements. This illustrates the value that has been set on labour in the very near past. It is not merely a waiting for work; as each day of unemployment passes, that day's energy is irretrievably

[1] Read before the Section of Public Health of the Australasian Medical Congress, Brisbane, 1920.

lost to production and in all probability there is a decrease in the efficiency of the labourer for his next day's work, should he find it, by reason, it may be, of loss of practice, underfeeding or other of the ills with which unemployment is surrounded.

The call of men for the army left vacant places in every walk of life and these were filled by older men, young boys and women. Then came the tremendous demand for munitions of war of every description—a demand undreamed of before in history, huge and urgent. There were no large stocks of munitions to be drawn on and every day mattered. To meet this unprecedented need every available labourer had to be pressed into service; old men, with skill and without, boys just fresh from school and especially women of every type, all entering on work of a character entirely new to them.

No longer was there unemployment; no longer was there a large army of workers employed on the manufacture of luxuries. Pauperism diminished and all were working steadily for long hours on the production of those munitions which were essential for the continuance of our national life. And by reason of this unexpected demand, a true realization came of the value of labour to industry, a knowledge of the asset which each individual's ability for work is to the State.

The Invasion of Women into Heavy Industries.

But there was no time to be lost in attempting to solve the many problems which were bound to arise with such an invasion. Munitions must be turned out and conditions must be such that production was as speedy as possible. Thus, in one of the first National Ordnance Factories to be established in England, where 15 cm. shells were being made by men late in 1915, difficulties arose about certain machine work and production was likely to cease. The Progress Manager gave the ultimatum that if the men did not continue under the conditions laid down, he would get their jobs done by women. The men did not think this possible and refused the conditions. On the Sunday evening, the day after the ultimatum, their places were taken by women on the lathes turning 15 cm. shells. There was no time to make special provision and preparation for the reception of these women. They came in at an emergency, reckoning as nothing the discomforts and hardships with which they had to put up. Many of these women were later personally known to me and were working still on 15 cm. shells at the signing of the armistice.

Naturally, sudden invasions such as these did not give time to consider the multitude of problems to which the introduction of women into that kind of factory was going to lead. We soon saw, too, many of those reforms which had been so dearly bought in the last century and which were the fundamental principles on which modern industry was based, abolished at one sweep. Employment of women on night work, continuous work on Saturday or Sunday, the lengthening of the shifts, excessive overtime, all these apparently retrograde steps had to be taken in order to meet the dire need of the moment.

Very soon there developed a full realization that if the worker was to continue at his or her job, whatever it might be, he or she must keep in health. It did not matter so much, from the production point of view, in olden days when there was a big surplus supply of labour to be drawn from. A worker was readily replaced and the scrapping of humanity by industry went on. With the fall in unemployment and the decrease in the supply of labour the human being became more precious and the health and well-being of the workers came to be a factor of vital importance. But there was the other great factor which was also being realized. Women were entering into trades and doing work which had hitherto been regarded as "man's work." Was the future of the race being endangered by those who should be the mothers of the future, having thus to undertake difficult and strenuous toil? The war was taking its toll of the strong manhood of the nation. It was more than ever important that the health of the mothers of posterity should be guarded. But, above all, munitions had to be made and there were only women left to cope with their manufacture. They could do this national service, but protection for their health and well-being was necessary and was a national responsibility. The realization of this led to the formation of the Health of Munition Workers Committee with Sir George Newman, M.D., as chairman.

The work which was done by this Committee and under its ægis from its inception in 1915 until the final report was issued in 1918, probably constitutes the biggest contribution which has ever been made to industrial hygiene and the changes in industrial conditions which have resulted from its recommendations, are permanent and epoch-making.

Naturally, the chief problems arose in the new engineering industries in which women had not previously worked, or in which they had only been employed to a certain extent. It was just in these industries where the demand was most insistent, the demand for guns, shells, more shells and later for air-craft.

A comparison of the numbers of women employed in the engineering trades at different times during the war shows the magnitude to which this employment of women had grown. Even to the very end of the war, dilution, that is, the drawing out of fit men for the Army and their replacement by women, was going on. In July, 1914, 170,000 women were engaged in metal working. In the first six months of war only 3,000 were added to the number. During the next six months an endeavour was being made to meet the demand for munitions by speeding up and facilitating the provision of supplies. Then came the real effort on the part of the Ministry of Munitions, with the establishment of national factories and the controlling of already established factories. But, at the same time, the calling out of fit men was progressing rapidly. Women were being put into munition works in great numbers and the next six months saw an addition of 46,000. This rapid rise continued to the end of the war, until in July, 1918, there were 600,000 more women definitely on metal work than there were in 1914.

A word must be said as to the nature of the work

on which these women were engaged. The essential feature of it was the intense specialization. A quick, alert girl could learn one small skilled operation in a very short time and this was the secret of the success of women in these engineering trades. Whereas the men who had been previously engaged on such work, could turn from one type of work to another, the women were trained in single operations, often of a highly skilled character.

The greatest number of women were engaged on shell making, on every size of shell, and were carrying out all the machine operations which the shell had to undergo from its entrance into the shop as a rough forging to its completion as a shell ready for the filling factory. The filling was carried on in special factories, almost entirely by women, or in the "danger buildings" of places like Woolwich.

We find them doing all fuse making, a great deal of gun work, tool making, grenade production and both wood and metal work in aeroplane construction. In addition, the multitudinous and constant examinations and gaugings which have to be carried out during these manufactures, were performed by women and they also won quite a place as makers of gauges—work which requires considerable skill and delicacy of handling. In general engineering works, forges, etc., women were carrying out many varieties of work, for example, from light to fairly heavy labouring, riveting, electric trolley driving, crane driving, assembling, acetylene welding, grinding, etc..

Organization.

Very frequently special modifications of the machinery were made to render the process more nearly automatic, thus reducing the skill required; also many devices were introduced for reducing the heavy labour necessary in moving shells, etc.. Thus when women were put on as machine operators in one national ordnance factory where I conducted several investigations and where only 23.7 cm. (9.2 in.) shells were made, the rough forgings of which weighed about 204 kilograms, it was necessary to employ men labourers, rough unskilled men for transferring the shells from one machine to another. But when dilution proceeded further and a certain number of men had to be drawn out of this factory for military purposes, the introduction of a "rolling bench" down the aisle between the rows of lathes at a height equal to the height of the gantry of the lathes and of a system of good pulleys enabled the women to do all the transferring of shells from machine to machine. Thus the enforced introduction of women to some of these processes compelled works managers to apply themselves to the adaptation of the machinery to the special physique and amount of skill of the women. But, as far as my experience went, in all cases such modifications resulted in a higher efficiency than the older methods, as will be easily evident if a moment's thought is given to the "rolling bench" system of transference of shells. With the introduction of women the output went up instead of down, as might reasonably have been expected. To quote from the Report of the War Cabinet Committee on Women in Industry issued in 1919:

> In some factories, notably in shell factories, the output increased enormously, but this was attributed chiefly to improved methods of production. "A woman is doing it better, not because she has got very much greater speed, but she has got very much better methods laid out to enable her to do it."

It will be fully realized that these women were specially the charge of the Health of Munition Workers Committee and the problems connected with the charge were numerous, important and of most varied character. On the satisfactory solution of these problems not only did the immediate production of munitions rest, but also the wider issue of preserving the health of the future motherhood.

It was not long before the Ministry of Munitions, on the advice of the Committee, organized a welfare department, at first under the directorship of Mr. B. S. Rowntree and later under Dr. Edgar L. Collis. It may be taken that the real function of a welfare department is to have that share of management which involves the responsibility for all the factors which can be classed as industrial hygiene in its widest sense. Thus from the very outset a woman supervisor will have the engagement of all woman labour for a factory and she bases her judgement on the suitability in physique, temperament and mentality of the applicant for the special job in question. This entails an intimate knowledge of the detailed workings of the factory, a knowledge which can only be gained by constant attendance in the factory, observing the movements and efforts required to carry out successfully and efficiently any particular operation and especially by discussion with works managers and such practical men, whose business it is to increase the efficiency of production. The careful selection of the workers is of great importance, as on it depends their health as influenced by the industry and attendant thereon the broken time, the wastage of workers, etc..

Then follows oversight over hours of work, the provision for meals, the sanitary arrangements, protective clothing, ambulance attendance, help and advice in matters of health, means of transit and housing facilities, recreations and games and so on. In addition to these functions, the welfare supervisor acts as adviser to women on matters of wages and all notices to leave work come before her. But these are matters which are not included in the scope of this paper.

It seems to me that some idea of the range of matters which are of importance to those who had charge of the industrial hygiene of groups of munition workers, is illustrated by the various reports which I, as a welfare supervisor, drew up of visits of inspection to various munition factories, not for the purpose of collecting data for investigational purposes, but for helpful suggestions along which to develope the industrial hygiene in the group to which I was at that time attached. I therefore quote a few extracts from two such reports. In the first case I am dealing with a national projectile factory situated in the North of England, whilst

in the second I am reporting a visit to a great British arsenal.

Report on Factory.

The situation of this factory is practically ideal; less than two years ago the area was occupied by a farm. It is well out from the town of L—— and on the banks of the River L——.

Many of the workers who are in lodgings, live at M——, a seaside resort; the workers are thus placed in the best environment for efficient work.

Almost 4,000 girls are employed in this factory, the shifts being of nine working hours and two shifts daily.

The shell output consists of 15 cm. (6 in.) and 23.7 cm. (9.2 in.) and "60 pounders" (*i.e.*, 27 kilograms), also guns and some hand grenades parts are made here.

Management.

On the management there is a lady manager, who is entirely responsible for all female labour, having to engage, dismiss and transfer the workers. She also is extremely interested in the sports and recreation of the women workers.

The principle adopted in this factory with regard to female labour is that every person engaged commences as a sweeper and promotions are made according to ability and opportunity. Thus we find that the two lady managers' assistants, spoken of as most reliable and valuable officers, entered the factory at the beginning as sweepers.

The forewomen have all been promoted in this manner, as also the charge hands.

The lady manager is pronounced in her opinion that this is a sound policy and considers that this chance of promotion is a prime factor in stimulating the girls to work more efficiently and to endeavour to give satisfaction from the point of view of both the output and conduct.

All records connected with the women are under the supervision of the lady manager.

The health and general welfare is under the supervision of the matron, who has a position in the management equal to that of the lady manager.

The lady manager is of opinion that the younger women are the most satisfactory and appears to consider that the most satisfactory ages are from 18 to 25.

To some these figures may seem to be too low and, no doubt, many who have had considerable experience with women as workers on strenuous operations, would certainly place the limits for best work with least injury to health and physique much higher. This point would well merit special investigation under the health and welfare section.

The matron, who has had a nursing training amongst other qualifications, and the lady manager have their headquarters in the old farm house.

The matron is responsible where feeding is concerned; the general provision of meals is carried out under contract by a caterer, who is provided with a little residence on the premises, almost adjoining the canteen.

Buildings.

There is one large canteen for men and women and this holds about 2,000. This is a fine, large room, excellently ventilated, with commodious kitchens and many facilities for quick serving. At the serving windows barriers are posted, thus preventing overcrowding and confusion which would be likely to occur, were they not there. In the canteen the tables are covered with white American cloth.

In addition to this canteen there is a dining-room for the women only, which is under the control not of the caterer, but the matron. The women can obtain hot water and tea and have their food warmed up and even eggs boiled, all free of charge. This room has accommodation for over 1,000 and is a fine room. In the dining-room the tables are bare boards and are scrubbed down after each meal. The floors are scrubbed daily.

The entire cleaning of the canteen is under the supervision of the matron; a forewoman is appointed, who is held responsible for this.

In both these rooms pianos are provided and on the night shift every evening some form of concert or "sing-song" takes place during the meal breaks.

To provide refreshments at the unofficial breaks, trollies go round the shops with tea urns and biscuits. The manager provides half the labour and the matron the other half for the purposes of serving this refreshment.

A good mid-day dinner is provided in a bright dining-room for the management and this meal forms an excellent opportunity for the discussion amongst the heads of problems which arise daily and are the better for immediate discussion and settlement.

Clothing.

The girls wear khaki overalls and caps and at the commencement of work for the factory they are provided with two outfits, which must be returned when they leave before a certain period. After these initial garments are provided, the girls are expected to buy their own.

The charge hands wear buff overalls with white turn-down cuffs and buff caps with white facings. The forewomen wear white overalls and caps.

A great many of the girls are wearing clogs; these are not provided by the factory, but they are daily becoming more and more popular with the girls.

Whenever an operation is of such a nature as to render gloves necessary, these are provided by the factory.

Blue tunic suits are worn by the crane drivers and the women in the press houses.

A few girls are engaged in the tool house, but none are working on the grinders.

Cloak Rooms and Lavatories.

The cloak rooms are excellently aired; the pegs are all numbered and a number is allotted to each girl, but the matron said she was not quite sure that every girl adhered to her own allotted peg.

The lavatories are not connected with the cloak rooms, but adjoin them.

Clean roller towels are put up for each shift and hot and cold water is provided at the basins. The soap used is "Lux," which is melted and put into boxes with a hole at the bottom, so that it can be extracted in small quantity by the finger.

The lavatories have concrete floors and these are scrubbed out once during each shift.

Ambulance.

At present five nurses are engaged here, three being highly trained nurses and two belonging to voluntary aid depôts. There is an ambulance for the men, nurses' room, the women's ambulance and a fine rest room for the women.

All these rooms open directly outside and are very fresh and cheerful.

Recreation and Sports.

As might be reasonably expected in such ideal environments, sport and games occupy a prominent part in the life of the workers.

Swimming in the river is a feature of the summer-time and two dressing huts are provided on the banks.

In the winter time, hockey is played by the girls and at Whitsuntide a very successful sports carnival was held.

A factory band, of which the members have been selected from the male workers, has been organized and contributes very considerably to the social life of the factory.

General Notes.

I was informed that a very large percentage of the girls are in lodgings and some live at M——. To meet the needs of these workers, a train runs into the grounds of the factory for each shift, bringing the workers to commence duty and taking away those who have just finished their work. The other workers, who are residing at L——, are catered for by motor-buses which run just at the time of changing shifts.

There are two time offices, one placed in a suitable position for the convenience of those who come in by the train from M—— and the other for those who come in by road.

Output.

I was at this time conducting a special investigation into women on the "ripping operation," the most strenuous operation in the making of a 15 cm. (6 in.) shell, therefore I was

particularly interested to notice the women on the "ripping operation," both on the 15 cm. (6 in.) and 23.7 cm. (9.2 in.) shells. These latter had been working on this operation for some months. A comparison of the actual output data from such a factory as this with our own output data on the same operations would be of very considerable interest and enlightenment.

In the manufacture of the 60 pounders (27 kilogram shells), moving belts are used for carrying the shells from one operator to the other.

Very valuable data could be obtained from this department dealing with the important question of weight lifting from the aspect of the woman worker's health.

Medical Examination.

No system of medical examination of the women workers for fitness or unfitness has been instituted.

Report on Arsenal.

The vastness of this arsenal renders the account of any visit but one of long duration or only very superficial character.

Some of the shops are of amazing extent, a notable example being the one known as the "New Fuse." Unfortunately, the number of girls working here was not at the moment obtainable, but the dimensions of the building were very great and the system of ventilation must have been excellent, for there was a freshness of atmosphere which is seldom obtained in workshops, but which is so desirable for anything approaching efficient working. There are some 27,000 women employed and the majority are working on twelve-hour shifts.

Welfare.

The head supervisor or lady superintendent must have had a gigantic task in organizing and carrying on welfare work among such a large number of women and where the dangers are so great. She has about twenty-eight assistant supervisors, who work on shifts of eight hours, there being no time, night or day, when there is not the full number of supervisors on duty. These assistant supervisors have special duties allotted to them, each being in charge of the welfare in a group of factories of the arsenal. In addition, they do the visiting outside, looking up those who are away and visiting those who are ill. The supervisors wear a uniform—a coat and skirt of khaki covert coating.

The head supervisor has the engaging of all female labour and clerical work in connexion with the women is done in this department.

The welfare department is situated quite close to one of the big gates and contains a private room for the head, a room for the clerical work, typing, etc., and a large room where women are interviewed and where the assistant supervisors do most of their work. There is a waiting-room for women seeking work, etc.. It appeared to me as if the quarters were very cramped with far too many activities being pursued in the one main room, resulting in an undesirable congestion.

Clothing.

As there are many differences in occupation, so there is variety in the clothing. Suits are worn when the nature of the occupation demands them. In the danger buildings all the women wear buff coloured overalls and caps and special shoes with flat soles. Across the backs of these overalls in large black figures the check numbers of the women are painted.

In connexion with the clothing in the danger buildings, the very excellent "shifting houses" were especially worth noting. In these houses each girl changes into her overall, takes all pins out of her hair, which is then pushed inside her cap which has an elastic in the border. She changes her shoes for the special ones worn in the danger buildings. These garments have been kept in bags of sacking with check numbers painted on, but a new system of cupboards has been introduced and is replacing the bag system of storing.

The cupboards occupy the walls of the shifting house and each cupboard contains sixteen compartments, four rows and four columns. To the middle joist of the cupboard a door is hinged and can be turned to close either the eight compartments on the right or the eight compartments on the left of the centre division. The door is made of a framework of wood covered with wire netting and there is a staple on each outer side of the cupboard, so that the door can be padlocked when in either position. The compartments at one side of the centre are for women on night shift and the compartments on the other side for the women on day shift.

In none of the factories do the women hang their clothes in the factory itself. In connexion with each shop is a cloak room for the women working there. Clothes hooks are fixed on rails which can be raised to the ceiling when the clothes are on. By this method the space is kept clearer down below to give access to the basins.

Lavatories.

In some of the factories these are out of doors, with entrances close to the exits from the shops. The passages between the rows of water closets is not roofed in. Certainly much is to be said in favour of having lavatories quite external to the shops themselves; the chief or rather only disadvantage is that of bad weather. The concrete floors of these lavatories are broomed out twice in twenty-four hours with disinfectant solution.

Medical and Ambulance Section.

Needless to say, in an arsensal of such extent and with so many workers (roughly 27,000 women and 45,000 men), in which many of the occupations are fraught with considerable danger, very extensive provision must be made to meet the emergencies which are likely to occur.

There is a main ambulance station, where there are surgeries, operating theatre, nurses' quarters and fine rest rooms for the women. In close proximity to the ambulance station is the arsenal hospital with resident medical officers (I think there are six in all and all women). This hospital is under the charge of a sister, but much of the nursing and domestic work is done by voluntary help; all cooking is done in the hospital. There are two fine wards and a little operating theatre. All these buildings are linked up by an external corridor. The hospital and ambulance buildings completely surround an open quadrangle, which is used by the patients for sitting out when weather permits. Of the two wards, one is for surgical and the other for medical cases. Some of the patients with skin poisoning (mercury and chlor-ethane) have required long spells in the medical ward. In the hospital was one old patient who had been there twenty weeks—an old woman who had broken her leg.

Situated in each group of danger buildings is an ambulance station, of course, on a smaller scale than the main one; but it is noticeable that in each one or two beds—not merely rest couches—are provided. The nurses work on shifts of eight hours, there being three relays for each twenty-four hours.

Ambulance trains are always stationed in the sidings at the arsenal.

Recreations.

One did not hear much of "recreations" here. However, active preparations were in progress for the holding of a big sports fête. This carnival is being held to raise money for "The Lady Superintendent's Benevolent Fund," which has been instituted to make relief grants to deserving cases of necessity which are bound to arise amongst 27,000 women employees. By the establishment and right administration of this fund, it is hoped to put a stop to shop collections which are made in special cases of need.

Canteens.

The canteens throughout the arsenal are run entirely by the Young Men's Christian Association and special patrons. Some of the canteens are enormous buildings, an especially notable example being one of the canteens for the women in a big group of danger buildings. Payment is made by metal checks which are bought at cash desks; all these checks are for one penny.

Large quantities of ice-cream at a cheap rate are sold in the canteens; needless to say, it is highly appreciated by the women.

Many of the canteen tables are covered with linoleum, which is found to be considerably more serviceable than

American cloth. This linoleum is bedded into the wooden top of the table.

Health and Industrial Output of the Woman Worker.

To quote the final report of the Health of Munition Workers Committee:

Speaking generally, there are five principal matters which, apart from the question of wages, concern the health and industrial output of the woman worker and which demand the careful and continuous attention of employers in regard to the employment of women in factories on any large scale, *viz.*:

(*a*) The physical condition and capacity of the woman worker, including the far-reaching issue of maternity.

(*b*) The period of employment (including night work, length of hours, overtime, etc.) and its relation to home duties.

(*c*) The necessity of rest pauses and the convenient provision of meals.

(*d*) The sanitary condition of the factory and the hygiene of the worker.

(*e*) Questions of management and supervision.

The Committee recognize that certain collateral issues, such as housing, transit and the means of recreation are also intimately concerned in the welfare of women workers, although they may be somewhat outside the immediate sphere of the employer.

It would be well to consider briefly under each of these heads the problems relating thereto and the conclusions which were reached as a result of the war-time experience of women in industry. It must be remembered that there was a unique opportunity for obtaining data, such as under ordinary circumstances could not possibly exist, a fact which renders the pronouncements of the Health of Munition Workers Committee of especial value.

Physical Condition and Capacity of Women Workers.

In the early stages of extensive employment of women in munition manufacture there was no very systematic method of selection and the hours of work were as a rule extremely long. Soon after the inception of the Health of Munition Workers Committee it arranged for a special inquiry to be made into the physical condition of groups of women workers and into the fatigue which existed as a result of the long hours of work. Many reforms were effected as a result of this report. Later, in 1917, a second inquiry of an exhaustive character was held by medical women and others with special factory experience; it was my privilege to take part in this second investigation. The reports of the several investigators were summarized by Dr. Janet Campbell and incorporated in the final report, some of the conclusions of which can well be quoted here:

1. That the fatigue and ill-health are less than might have been anticipated, having regard to the hours of work and the nature of the employment, and that this is due, broadly speaking, to the greatly improved attention to the health and welfare of the workers.

2. That fatigue and sickness are greatest where heavy work is combined with long hours at the factory and associated with onerous domestic duties after factory hours.

3. That, unless brought under control, the considerable amount of moderate weariness and ill-health now present is likely to reduce immediate efficiency and also exercise in many cases an injurious effect on subsequent health and on capacity for maternity.

4. In particular, the findings of this inquiry seem to indicate the necessity:

(*a*) For further shortening of the hours of labour for women.

(*b*) For restricting women's work in the heavier branches of industry to those who are young, physically fit and capable and who have not arduous home duties to perform.

(*c*) For the continuation and development, wherever women are employed in factories, of hygienic conditions and especially "welfare" arrangements (including industrial canteens).

(*d*) For making appropriate provision for effective medical supervision, both on entrance to the factory (in heavy and exceptional occupations) and subsequently, by means of the services of medical officers (women preferred) and nurses and in the form of suitable accommodation as to rest rooms, first-aid appliances and well-equipped surgeries.

The Maternity Problem.

In connexion with this question of the physical condition of the women there arose the problem of immediate maternity. This is not a problem which is likely to occur in connexion with women in industry in Australia. Fortunately, conditions are such that women have not to work in factories when they are bringing up young families. The position was entirely different in England during the war and remains so even after its conclusion, for there are many women with young children and husbands partially or wholly incapacitated by war. Allowances will not meet the cost of living and the mothers, able to command high wages, will certainly go out to work.

The result was the elaboration of a scheme of maternity care, which provided for graduated employment, pre-natal, natal and post-natal care. The scheme was only put into working order towards the close of 1918, but there seemed considerable likelihood of it being the foundation of a permanent plan to meet the need which certainly has existed and will exist for some time in England. To my mind, one of the strongest features of the scheme was the provision of good meals during working hours for expectant and nursing mothers—a most valuable provision in view of the difficulty of obtaining and cooking food. In connexion with some factories crêches were instituted, while in certain towns municipal crêches and nurseries were established near munition works.

It was soon realized by some of the factory managers, where heavy and exacting work was being performed, that it would be to the advantage of workers and management to have a system of medical examination for the women by women doctors. In the group of factories in which I chiefly worked, this was instituted and all women employed in the factories were systematically examined by a medical officer, who reported as to the physical fitness of each women, whether or not she was suited to heavy work and, in case of defects, to recommend remedial measures where such were possible and so forth. The welfare supervisor acted on the medical officer's advice and arranged for lighter work for those whose physique was not suitable for the employment on which they were engaged. After all the women at work in the factories had been examined, the rule was made that new women engaged were to be examined during the first fortnight of their employment. This medical examination took place during working hours and was generally conducted on the night shift. There is no doubt whatever that very beneficial results ensued as the outcome of the

system of medical inspection, resulting in better health and comfort for the women and higher efficiency from the production point of view.

To take an example, I examined statistically the returns of Dr. Rhoda Adamson, the woman medical officer for the group of National Ordnance Factories already referred to, the total examinees numbering over 5,000. There were roughly over 19% of these with some eye defect. Of these, only half had received attention for their eyes. Of those who had received attention, 62% had suitable glasses and were then classed as "fit workers." The other half were working under the disabilities of various eye defects, rendering them less expert workers and thus reducing the efficiency of production and perhaps endangering themselves and fellow-workers. One may roughly assume that if this half underwent treatment, 60% would be then able to be classed as "fit."

The statistical consideration of these medical reports and the facilities which I had for seeing the beneficial effects which could accrue to both workers and management by the judicious following up by welfare departments of the medical officer's reports, led me to the strongly confirmed opinion that where, as in England, the Government has responsibility under the National Insurance scheme for the medical care of workers over sixteen years of age, there should certainly be a medical examination of each worker, when being entered as a participant in the individual benefits of a national medical service.

Hours of Work.

The gradual limitation in hours of work which had been taking place in the last seventy years, had resulted rather from the alteration in outlook than from any extensive and definite proof, as far as output is concerned, of the efficiency of the short working day. The motives had been chiefly philanthropic or socialistic. This war emergency has provided the opportunity of showing very conclusively by scientific collection of data the advantage of a reasonable working day. As is well known, at the outset of the big munition production long hours of work and excessive overtime were resorted to as the means of increasing production. Night shifts and absence of week-end and even any holidays were part of the scheme. With ready access to all data, investigators on behalf of the Health of Munition Workers Committee soon attacked this question of hours of work. Dr. H. M. Vernon applied himself especially to the problem of the output in relation to hours of work. Professor Loveday devoted himself to the problem of lost time and Major Greenwood undertook most laborious investigations concerning the wastage of workers. Most valuable data were collected for very varying classes of work and under different lengths of working day, etc., and the conclusion arrived at with reference to this vital question are best given in the words of the following extract from the final report:

The evidence showed that long hours are open to certain serious objections:

(*a*) They are liable to impose too serious a strain on the workers.

(*b*) At any rate after a period the rate of production tends to decrease and the extra hours produce proportionately little or no additional output; moreover, the quality of the output may be adversely affected during the whole period of work and not only during the hours of overtime.

(*c*) A large proportion of the hours gained may be lost through broken time; the workers become exhausted and take a rest; sickness tends to increase.

(*d*) They lead to an undue curtailment of the periods of rest and sleep available for those who have to travel long distances to and from their work.

A further laborious and conclusive investigation by Dr. H. M. Vernon on the incidence of industrial accidents pointed definitely to the increase of accidents with long hours of work.

When I first took up my duties in the ordnance factories already referred to, the women on the manufacture of 15 cm. (6 in.) shells were working a twelve-hour shift, alternating weekly on day work and night work. The week's work for night shift commenced at 6 p.m. on Sunday evening and finished at 6 a.m. on Saturday morning, giving 72 hours a week in the factory. In the final report, the Committee quotes from a report with which I furnished them as follows:

It appears that out of 140 women 99 were having under eight hours' sleep to fit them for a night of twelve hours shift *plus* travelling time. Moreover, out of 146 women only 16 felt that they were able to go out at all during the week. Where replies were not given, it was in general because of the obvious absurdity of asking the women what they did in their spare time, after having heard their account of domestic responsibility.

It may, therefore, be very strongly urged that these hours of work, coupled with the distances travelled, are such as to preclude the women taking any outside interests if they are to get sufficient rest. It is obvious that the majority of the women recognize this and are content to save themselves only for their work. Such a sacrifice may be with justice demanded for a short period through the exigency of a great and unexpected emergency, but should certainly not be enforced for a longer period than is absolutely necessary. It may again be noted that already many of these women have worked on these long hours for sixteen months.

Shortly after this inquiry the length of shift was reduced and three shifts per twenty-four hours replaced the two shifts. Before the report was compiled, I made careful estimations of output of women on the heaviest operation in the 15 cm. (6 in.) shell making and was able when the change to short shift had been made and equilibrium of output attained, to make further estimations of output on these reduced hours of work. My conclusions are embodied in Report No. 2 of the Industrial Fatigue Research Board;[1] they point definitely to the high increase in efficiency due to reduction of hours.

Night work was not found to have the ill-effects which are generally ascribed to it. As a matter of fact, the output curves show a marked evenness, which is probably ascribable to the absence of excitement which frequently influences the day curves of output. There is no reduction in output on night work, but very frequently there is an increase.

Naturally this is not a factor which will be of consequence in Australian industry as far as women are concerned, for night work presents many disadvantages which put it quite out of the range of

[1] "The Output of Women Workers in Relation to Hours of Work in Shell Making."

industrial politics here. These facts are, however, of considerable importance in consideration of the six-hour day system advocated by Lord Leverhulme, the essential feature of which is continuous production, which involves night work—the sweating of machinery but the saving of the worker.

A factor of immediate bearing here, however, is the "length of spell" and the provision of rest pauses. Dr. H. M. Vernon carried out extensive inquiries into the proper allotment of the hours of work. Output returns point very definitely to a five-hour unbroken spell as being too long and also to the wastefulness of pre-breakfast spells. The experience of observers points to the four-hour spell of work as being the longest compatible with maintained efficiency.

The advantage has also been clearly shown of a short mid-morning spell for the partaking of some small nourishment in the case of women, who are too apt to set out to work after having taken far too small a breakfast. It must also be borne in mind that to the work spell must be added the time of transit in order to find the interval without food.

The Provision of Food.

This brings up the important question of food provision. Owing to the special exigencies of the time, the feeding of munition workers had to be largely taken in hand by the Ministry of Munitions. It was realized that work could not be done unless the operator was adequately fed; this, under the old existing conditions, was impossible, owing to the difficulty of obtaining food and fuel for cooking purposes. The Liquor Traffic Central Control Board in 1915 appointed a Canteen Committee, of which Sir George Newman, M.D., was chairman and on this Committee fell in a large measure the feeding of the munition workers. It is impossible to enter into the question here, but it must be noted that the experience of the war time has established on the firmest footing the necessity for industrial canteens. There may be provided at these canteens entire meals or parts of meals, or food brought from home may be warmed up and hot beverages be obtained, or even only hot water for tea making.

There should be adequate accommodation for workers to take their meals in decency and comfort and certainly in an environment other than where they are working the whole day. The character of the necessary provision naturally depends on the number of workers and the nearness to their homes, etc., but the importance from the points of view both of the health and well-being of the worker and of the efficiency of production of adequate diet taken in suitable surroundings cannot be too strongly stressed.

In this connexion it is worthy to note that a most valuable collection of statistics on dietetics has been gathered together under the direction of Professor Leonard Hill on behalf of the Health of Munition Workers Committee.

With the industrial canteen as nucleus, it frequently happened that social intercourse grew rapidly and in many factories flourishing clubs were developed which, organized by the workers themselves, catered for both indoor and outdoor social life and amusements, from concerts and gymkhanas to the publication of factory magazines.

A lesson which was learnt by the women on munitions, was the need for sufficient, wholesome food. Frequently some young machine operator on heavy shells said to me: "I am ashamed, I get so hungry. I feel I could eat a man's meal." Then, after a pause: "But then I am doing a man's work!" The bun and cup of tea diet of the work girl was no longer fuel enough for the machine.

Housing.

Intimately bound up with the diet problem was the housing problem. The sudden growth of a new industry resulted in lack of housing accommodation in the vicinity of the factories. Hostels for munition workers were instituted; sometimes large old houses were modified to meet this want; in other cases they were newly erected buildings of a temporary character, such as the extensive hostels for Woolwich Arsenal workers at Eltham, where there were private bedrooms and great canteens; finally there arose such developments as Gretna, where out of unbroken countryside a great town suddenly sprang into being.

Transit and Environment.

No doubt there is a lesson to be learnt on the possibilities of decentralization of industries. Very frequently a more acute problem than the housing was the question of transit. Reduced tram and train services, etc., coupled with the enormous numbers often employed in one factory, caused great congestion and discomfort. All such factors add greatly to the burden of the working day and should never be lost sight of in considering industrial questions.

The factory environment is of the utmost importance. Men react rapidly, but even more marked in women are the effects of a wholesome, clean, well lighted and well aired workshop. Adequate washing facilities, cloakrooms and sanitary accommodation are as necessary in a factory as good machinery. One should not aim at a minimum necessary to comply with an imposed regulation, but the best of factory environments should be provided. Every little attention paid to these matters is more than amply returned in health of workers and efficiency of production. These are lessons which have been driven home day after day to those connected with the production of munitions.

The provision of first-aid attentions, of a rest-room under proper supervision, the wearing of suitable overalls and other protective garments are all measures which are now, as a result of war-time experience, part and parcel of industrial hygiene.

Special Dangers.

I have not touched on the very special problem which arose in connexion with the filling factories, where there were constant dangers, both of explosion and of poisoning, and where night after night these dangers were added to by the possibilities of air raids. Surely the heroism of the girls who en-

dured these dangers throughout the weary months, was of a high order.

To combat the disastrous effects of trinitro-toluene, Professor Benjamin Moore, on behalf of the Health of Munition Workers Committee, carried out extensive experiments. As an instance of the possibilities of scientific industrial hygiene the figures concerning trinitro-toluene poisoning are worthy of quoting. According to the Home Office returns, during the quarter October to December, 1916, 86 cases of trinitro-toluene poisoning occurred, 23 of which were fatal. In 1917, during October to December quarter, there were 29 cases with four deaths, though the numbers employed on trinitro-toluene work had increased very greatly. In the final report issued in 1918 the Committee could say that trinitro-toluene poisoning had practically been abolished.

General Considerations.

I regret that I have only been able to deal in a very superficial manner with the subject with which the Preventive Medicine Section of the Congress intrusted me. The subject is large and the development during the war years was unprecedented.

I cannot close without making a reference to the development which appears to me to have special bearing on the women in industry in Australia.

(1) In the development of a national medical service there should be provision for the medical examination of workers, which is a necessary sequence to the system of medical school inspection. Physical fitness for any occupation is essential for the well-being of the worker and for the greatest efficiency in production.

(2) The great benefits resulting from a well-administered welfare system have been proved beyond doubt and it should be a definite part of industrial policy to develope a system of welfare, controlled equally by workers and management.

(3) There is much to be desired in factory environment in the way of meal-rooms and canteens, rest-rooms, first-aid provision, etc., and the importance of these factors cannot be too strongly stressed.

(4) The value of scientific investigations into the problems of industrial hygiene has been strongly evidenced and one might well hope to see the establishment of a committee responsible for these developments as a unit in the scheme of national preventive medicine.

INDUSTRIAL MEDICINE.

By **Ivan Blaubaum, M.B., Ch.B.,**
Armadale, Victoria.

IN these days, when preventive medicine is in the forefront of medical discussion, it may be of interest to the profession to know what is being done in industrial life to prevent disease and to have assessed the value both to employer and employee of an efficient scheme of medical supervision in industrial enterprises.

About a year ago I was invited by the Barnet Glass Rubber Company to report on the subject of medical supervision of their employees and to formulate a scheme to this end. After tracing the advance of industrial medicine in other countries, especially America, I was able to present a report which was adopted and which has been in operation for the last six months. The experience thus gained has encouraged me to write this article.

Industrial medicine may be defined as the theory and practice of medicine applied to the purpose of preventing and alleviating sickness and injury among industrial workers in order that they may enjoy the benefits of continuous productive employment.

To this end employers provide:

(1) Safe and healthy places to work in.

(2) Machinery, tools, etc., which permit of rapid work of good quality with chances of accidents reduced to a minimum and many other benefits which we need not here discuss.

But so far in Australia most employers have not seen the necessity for insuring as far as possible the good health of their employees and it is daily becoming more necessary for medical supervision to be introduced into large industrial concerns.

The work of a medical officer in the larger factories of America deals, among many other things, with the environment in which the employee spends his hours, with special reference to lighting, ventilation, cleanliness, safeguards for health, treatment of illness and prevention and treatment of accidents. I am fully aware that the scheme I am about to describe falls far short of the ideal, but the smallness of the industrial concerns of Australia as compared with those of America does not allow of anything approaching the efficiency to which welfare work has attained in the latter country. For instance, at Dayton, Ohio, one company maintains twelve full-time medical officers, sixteen nurses, a well-equipped hospital and a convalescent home in the country. This firm employs 11,000 hands and is really a small city in itself.

For the most part, industrial concerns in Australia can only employ part-time medical officers.

The duties of the medical officer at the Barnet Glass Company's mills are:

(*i.*) Attendance daily for one hour.

(*ii.*) Giving advice and treatment to any employee who needs medical attention.

(*iii.*) Treatment of minor injuries which have occurred during the day.

(*iv.*) Giving advice in matters of sanitation, etc., in connexion with the factory.

(*v.*) Examination of new aspirants for employment, to insure their physical ability to carry out the proposed work.

(*vi.*) To advise in case of epidemics.

(*vii.*) Examination of employees who show a falling off in their capacity for work.

In addition to the medical officer, a fully trained nurse is present during the working hours. A building is provided, consisting of three rooms—a female employees' room where sick girls can lie down, a casualty room and a consulting room.

The advantages, both to employer and employee of a policy of this kind, are as follows:

1. A great increase in the effective strength of the employees, leading to increased efficiency and loyalty. For example, aches and pains and minor ailments which are often ignored, under the stress of work may assume serious dimensions and finally cause the employee much subsequent loss and suffering to himself and loss to his employer. Early treatment would do much to shorten the period of his disability. This is particularly exemplified in cases of wounds of the fingers and hands. Without a medical establishment these are neglected and lead very often to such degrees of sepsis that the worker is incapacitated for weeks. Since the institution of medical supervision serious septic conditions of the hands have been extremely rare. Another example which came under my notice, was that of a man who suffered from repeatedly recurring attacks of peritonsillar inflammation. From this cause alone he lost twenty-seven days' work in six months, which meant a loss of £25 to him and another loss in production to his employer. Enucleation of his tonsils completely cleared up the condition and since then he has not lost a day in four months. His foreman reports that his capacity for work since operation has increased 100%.

2. Detection of infectious disease and early treatment of "contacts" not only insures against a large list of workers absent on account of illness, but also tends to prevent the possibility of the "contact" carrying the disease into his own home. Several cases of diphtheria have come under my notice. Prophylaxis was practised with all "contacts" with excellent results.

3. Medical supervision may do much to obviate accidents.

4. Examination of aspirants for employment would do much to stop the constant changing hands which goes on at present. It would fit the employee into the work in the factory which he is capable of doing without injury to his health and thus render him a more efficient and more satisfied man. I have discovered three men and one girl with heart lesions due to old rheumatic fever, who were struggling on in an endeavour to do hard manual work, such as lifting and carrying heavy weights from one part of the factory to another. In all cases I have endeavoured to have them transferred to some equally paid job entailing less physical strain, with mutual satisfaction to themselves, their foremen and employers.

5. The advantage to the works manager of a knowledge of how long an employee is likely to remain unfit for duty.

6. The detection of malingerers.

7. The examination of employees who show a sudden falling off in their capacity for work. This is found in America to be due in almost every case to some defect in health and especially applies to female employees. Various conditions may cause it, such as anæmia, tuberculosis, gynæcological displacements, etc., which, though having their effects in the early stages, are not thought to be sufficiently serious to justify the individual in seeking medical advice.

The system therefore requires the foreman who notices that there is some trouble, to send the employee to the company doctor and very often the early stages of disease are discovered and timely treatment results in cure.

There are many other advantages which could be adduced, but the foregoing are the most obvious and are of themselves an eloquent plea for the establishment of medical supervision in industry. "Industrial medical service is not a gift to labour nor a charity, but purely a function of good business." The reasons which should induce employers to provide their workers with medical service, may be summarized as follows:

1. It is an acknowledgement of their obligation towards the workers who sustain injuries during employment and an economical means of procuring expert attention for them.

2. It is an instrument for removing or minimizing certain causes of lost time.

3. It has been found to be of use in stabilizing industry from the point of keeping down the labour turnover.

4. It enables workers to produce more.

5. It contributes to a sense of security among employees and promotes a feeling of goodwill towards the management.

Thus, industrial medicine is not only humane, but essential to production. It is beneficial to workers and profitable to employers. From the point of view of the general health of the employee, I have had striking results. Without going fully into the statistics for the last six months, I may mention that, on my advice, eleven employees have had their tonsils enucleated. Three cases of antrum trouble have been cleared up, errors of refraction have been corrected in seventeen persons and many have had their dental troubles adjusted.

Many other conditions have been treated and altogether the general health and the capacity for work of the employees concerned must have been greatly improved.

In conclusion, I would point out that if the policy of the employer is to assist his working people, he can only do so by selecting them with consideration of their fitness for the work they are expected to do, by helping them to be regular, dependable and efficient and by aiding them constantly to increase their value.

Without a medical service the full accomplishment of these ends is impossible.

Finally, I wish to acknowledge my indebtedness to various American pamphlets, etc., which have been of assistance to me in this work.

Reports of Cases.

TRANSFUSION WITH SMALL AMOUNTS OF MOTHER'S BLOOD IN MELÆNA NEONATORUM.

By Brian H. Swift, M.C., B.A., M.B., B.C. (Cantab.), *Adelaide.*

TRANSFUSION with mother's blood has lately been used extensively in the treatment of hæmorrhage in the new-

born. Unger[1] reports that transfusion is a specific and advises that the usual dosage for infants be between 80 c.cm. and 100 c.cm..

Robertson[2] advocates that the dose should be 33 c.cm. of blood per kilogram of body weight. He quotes forty cases with four deaths. Taylor[3] quotes a case in which four intramuscular injections were given of 15 c.cm. of whole blood without success. Then 300 c.cm. of citrated blood were injected into the longitudinal sinus and repeated some time later; the infant lived. Lowenberg[4] reports one case of cure of *melæna neonatorum*, 80 c.cm. being used. In this article the technique of transfusion into the longitudinal sinus is admirably given.

From these extracts it is seen that large amounts of blood have been used in each case. Laurie reports a case in which he used 20 c.cm., but I have been unable to find any other published case in which small amounts of blood have been used in transfusion. Hutchison[5] and Dixon,[6] however, each report three cases of cure by intramuscular and subcutaneous injection of whole blood or serum in varying amounts up to 10 c.cm..

The risk of incompatibility of the mother's blood has been investigated by Happ.[7] He found that in infants up to one month old this did not apply.

The theory as to the reason why transfusion should check the hæmorrhage was discussed by Ashby,[8] who stated that in nearly every case of persistent bleeding in the new-born, if blood transfusion can afford any benefit, small doses only of blood are required. The reasons for this are:

(*i.*) The breakdown is in the production and not in the action of thrombin.
(*ii.*) The action of thrombin is qualitative or only slightly quantitative.
(*iii.*) A few cubic centimetres of normal blood contain enough thrombin (or enough of the missing precursors of thrombin) to enable the second stage of clotting to take place.

The transfusion of a few cubic centimetres of blood is a very much simpler procedure than in the case of large amounts and can be carried out at a moment's notice. I was lucky enough to have two cases of *melæna* in less than a month and so was able to try the injection of small amounts of blood into the longitudinal sinus. To strike the lumen of the longitudinal sinus through the anterior fontanelle would be very difficult, as it is only about 1 mm. in diameter at this point. However, on each side are the sphenoidal sinuses and it is into one of these that the blood is probably injected.

Case I..

Mrs. A., aged 38 years, in her tenth pregnancy, was delivered on July 16, 1921, of twins at the Queen's Maternity Home. The presentation of both infants was breech. The first, a girl, was born at 10.10 a.m., the second, a boy, at 10.25 a.m.. There was no delay, but the boy was blue and required stimulation. At 8 a.m. on July 18, forty-eight hours after birth, the boy vomited some dark blood and at the same time passed a large quantity of blood by the bowel. At 10 a.m. another large amount was passed, but he did not vomit. The child was collapsed, very white, with very feeble and slow respirations. Five cubic centimetres of the mother's blood were drawn into a syringe from a vein in her arm and injected into the longitudinal sinus or one of the sphenoidal sinuses at the posterior angle of the anterior fontanelle. The blood entered quite easily.

The child was given 0.6 gramme of gelatine and 0.6 gramme of lactate of calcium in 30 c.cm. of water and had small quantities of pure whey by mouth. There was a slight hæmorrhage from the bowel at 3.30 p.m.. The child was fed on whey every two hours and was given 0.3 gramme of calcium lactate every four hours. No further hæmorrhage occurred until 5.30 a.m. on July 20, when another large amount was passed by the bowel. The child was moribund. Five cubic centimetres of blood were again taken from the mother, but this time the blood clotted, so the same quantity of citrated blood was used and injected as before. The child did not have another hæmorrhage.

On July 22 a small dark black motion was passed and on July 23 a normal bowel action; on July 25 he was put back on the breast. He was still slightly jaundiced, but improved daily and was discharged on August 8, 1921.

This case is interesting, as the twin sister was quite normal. Unfortunately the placentæ were not kept at birth.

Case II..

Mrs. B. gave birth at the Queen's Home at 2.30 a.m. on August 8, 1921, to her second, a female, child. Her previous labour was normal and this labour only lasted four hours.

At 9 a.m. on August 9, 1921, the child had a profuse, bright red hæmorrhage from the bowel. The child's colour was good, but the hæmorrhages continued. There were four large hæmorrhages during the day and at 8.30 p.m. the child was collapsed and white. Eight cubic centimetres of the mother's blood were drawn from a vein in the arm into a syringe with a little citrate solution in it. A needle was pushed through the anterior fontanelle and after a little difficulty blood was obtained. The syringe of the mother's blood was connected and the blood injected. The child had several small hæmorrhages during the next two hours, but after that the hæmorrhage stopped. The child was given whey and 0.3 gramme of calcium lactate every four hours. The child passed a dark motion twenty-four hours later and a normal motion on the next day. On August 12, three days after the first hæmorrhage, the child was put back on the breast and was discharged on August 20, looking very well but white.

According to other writers, in both these cases the patients ought to have had over 100 c.cm.. This would have meant a much more elaborate proceeding, whereas nothing could be simpler than the withdrawal of a few cubic centimetres of blood and injecting it at once.

Of course, these are only two cases and it is impossible to say whether the injection of a small amount of blood would always have as good an effect as a large amount.

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(1) Unger: *Journal of the American Medical Association*, September 13, 1919.
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(4) Lowenberg: *Archives of Pediatrics*, April, 1921.
(5) Hutchison: *Transactions of the Royal Society of Medicine*, October, 1917.
(6) Dixon: *British Medical Journal*, April 17, 1920.
(7) Happ: *Journal of Experimental Medicine*, March, 1920.
(8) Ashby: THE MEDICAL JOURNAL OF AUSTRALIA, January 8, 1921.

A CASE OF RETRO-BULBAR NEURITIS ASSOCIATED WITH SYMPTOMS AND SIGNS OF DISSEMINATED SPINAL SCLEROSIS.

By **Hugh Armstrong, F.R.C.S. (Eng.)**,
Hobart.

J.P., aged 35 years, employed as a stoker at a gas works, came to me complaining of failure of sight in the left eye. A fortnight previously he was perfectly well. The failure of vision was accompanied by considerable pain at the back of the eye, more especially when rotating to the left. The vision was: Left, $^{4}/_{60}$; right, $^{6}/_{6}$, but slowly. There was no nystagmus. The left pupil was motionless to light, but consensual movement was energetic. Ophthalmoscopic examination revealed that the media of the left eye were clear, the disc was much obscured by a steamy haze, more marked on the outer side, the disc area was pallid and the margin was barely visible. No cup was traceable. The veins were much distended, while the arteries were normal in size. In the right eye the south-west quadrant was distinctly paler than the rest. There was a very slight steamy haze. Pressure on both globes, especially the left, caused great pain.

He also complained of considerable heaviness of the lower limbs. The knee-jerks were greatly exaggerated. There were numerous patches over the inner sides of both

legs and arms into which a pin could be stuck without causing pain. His speech was slow and slurred, but not scanning. His general expression was sleepy. He picked up a pin with difficulty. He complained of "stiffness" in moving his eyes, probably due to reluctance to cause pain. No scotoma was detected on the right side, but the vision on the left was too poor for testing.

There was no history of vomiting, vertigo or headache. His habits had always been temperate, but he had smoked heavily in the preceding six months. There was no history of syphilis; plumbism was unlikely, as he had never had colic or wrist-drop and showed no signs of a lead line. But his work exposed him to considerable and rapid alternation of temperature.

On inquiring into his previous history, I learnt that he was in Greenwich Hospital thirteen years before for nerve trouble, consisting of loss of power over the legs, with numbness of the skin, but no pain. The knee-jerks had been tested frequently, though he could not remember the result. His eyes had been often examined by Sir Dyce Duckworth and Dr. Buzzard. At that time a tap on the top of the head hurt his back. He had recovered at the end of six months and went to sea. During one voyage round the Cape he had lost power over his left shoulder and even when I saw him it was stiffer than the right. He was married and had three healthy children.

Progress.—A week later the sight was worse. He was able to count fingers only with the left eye. The right disc was more hazy. There was no proptosis, but the pain on movement and pressure was not so great.

A few days later there were two areas of retinal œdema in the north-west quadrant of the disc. The patient had no perception of light with the left eye.

On July 24, 1920, the tactile sensibility in the legs was found to be much improved.

On July 27 perception of light had commenced to return. The edge of the disc was discernible and the retinal swelling was less.

On July 30 hand movements were seen plainly. Ocular movements caused no pain.

The subsequent history was that of steady and rather rapid improvement of vision.

By January 6, 1921, the left eye saw $^{6}/_{12}$ fairly quickly and the disc pallor was disappearing, the surface being faintly pink. Iodide of potash in doses of 0.6 gramme was given three times a day throughout the course of the illness.

The association of retro-bulbar neuritis almost confined to one eye with a group of symptoms and signs indicating changes in the spinal cord, random as well as transient, is sufficiently uncommon to merit recording. The more so, I think, as it suggests that these are spinal changes, preceding the formation of permanent sclerotic areas, disseminated spinal congestions which are responsive to treatment. At first sight it may seem peculiar that such a specialized sensory nerve as the second should be associated with spinal cord lesions, but the development of that nerve directly from the thalamencephalon puts it in close relationship with the great nerve centres and renders it liable to the same pathological changes that are met with in the brain and spinal cord.

In this case the relationship seems still closer in the similarity of mode of onset and disappearance. The morbid process in the cord and nerve was one of congestion, with œdema and compression of nerve cylinders; whether it was the early stage of inflammation or bacteriologically embolic it would be hard to say. But the rapid recovery certainly points to its being interstitial and not parenchymatous.

A morbid blood process would range over a wider field I think. What effect over-exertion under conditions of exposure and rapid variations of temperature in a man who came of a rheumatic stock such as this patient, would have would not be difficult to imagine. But why a protected structure such as the optic nerve should suffer from such an influence is harder to comprehend. The developmental connexion may furnish the explanation.

The fundus picture, venous congestion with œdema of the disc and retina that came and went much in the same way as the spinal lesions would justify almost the term retro-ocular localized congestion and not neuritis as the better nomenclature in such cases. Untreated, they would go on to inflammations and ultimate permanent scleroses; but the iodide very quickly cleared the matter up.

Of other causes a localized meningitis was suggested by the pain and a periostitis of the optic canal, but painful ocular movements and pain on pressure made the former unlikely and absence of pressure signs on the artery would be against the latter.

The prognosis will depend on his method of living; a repetition of exposures to cold and damp will always tend to light up what are really potential scars and for that reason more vulnerable to morbid influences. Ultimate sclerosis with permanent interruption of nerve conduction will probably take place in the course of time.

A CASE OF ANTHRAX.[1]

By Hedley Brown, M.B., Ch.M. (Syd.),
Resident Medical Officer, Brisbane Hospital.

J.K., aged 39 years, was admitted to the Brisbane Hospital on June 4, 1921. He walked into the hospital and reluctantly agreed to go to bed. He complained that he had had a "boil" on his neck for one week and that during the previous night his neck had swollen.

On admission, his temperature was 37.8° C., pulse-rate 112 and respirations 26. He said that he did not feel ill nor did he look ill. He was a big man, about 182 cm. in height, and weighed about 76 kilograms. He was employed on the sewerage works as a cement worker and on the previous day had worked fifteen hours. He retired to bed in good health and was awakened at midnight with a feeling of swelling in his throat and neck. He stated that, as far as he could remember, he had cut his neck while shaving about a week previously and had had a "sore" there since. The shaving brush he was using was a new one and he had only used it on four occasions.

His previous history is very interesting. He was a 1914 member of the Australian Imperial Force. On February 3, 1921, he was admitted to this hospital suffering from tetanus. After persistent treatment, during which time he received 60,000 units of antitetanic serum, he recovered. He was discharged cured of tetanus on April 3, 1921.

Examination showed a pustule on the left side of the neck about 2.5 cm. behind the angle of the mandible and 3.8 cm. below the lobe of the ear. The left side of the neck was œdematous and brawny as far down as the clavicle, but was not tender. The cervical glands on the left side were swollen. He complained of pain in the middle line of the neck above the suprasternal notch.

The pustule had a black circular necrotic centre about 3 mm. in diameter. Surrounding this was a ring of vesicles, which collectively formed a marked whitish contrast to the black centre. Surrounding the vesicular area was a reddened, congested brawny zone. The whole area was less than 1.25 cm. in diameter.

On examination of the abdomen it was found that the spleen was not palpable, but there was tenderness over the splenic area on bimanual palpation. Shortly after admission he complained of headache and pains in his legs.

The vesicles were punctured with a hypodermic needle and 0.5 c.cm. of clear fluid was withdrawn. A smear was made from the area of the black centre and the vesicles. Sloped tubes of agar were also inoculated. The pustule was then touched freely with pure carbolic acid.

The smear was stained with carbol fuchsin and an aqueous solution of methylene blue. The presence of *Bacillus anthracis* was demonstrated.

As soon as the diagnosis was established, immediate operation was performed. Under ether anæsthesia an area about 5 cm. in diameter and 1.25 cm. in thickness, with the pustule as its centre, was excised. The raw area was swabbed with pure carbolic acid and spirit. Then a swab soaked with 1‰ solution of perchloride of mercury was left in the raw area.

The patient was isolated. He complained very little, except that he had a tight feeling in his neck.

Perchloride of mercury irrigations were regularly carried

[1] Read at a clinical meeting held at the Brisbane General Hospital on June 10, 1921.

out and stimulants were freely given. Blood was withdrawn and saline solution injected intravenously and subcutaneously. Saline solution was also given regularly *per rectum*. Pure eusol was injected round the advancing margin of the œdema. No serum was to be obtained locally.

The patient slept well that night and also on the following night. He took his nourishment well and complained very little. Throughout he was not depressed and stated that he felt well, except for the tightness in his neck. His respirations were not increased and his temperature did not rise above 37.8° C..

The œdema gradually spread to involve the right side of the neck and his thorax as low as the fourth costal cartilage. It was hard, brawny and not tender. The skin over it was reddened and the advancing margin was clearly marked. The cervical and axillary glands were much swollen.

About forty-eight hours after admission his temperature began to fall and remained at 35.5° C. for some hours before his death. His pulse-rate rose to 128 and his respirations to 30.

The patient died about sixty hours after admission. Blood cultures were made immediately after death.

The culture made from the pustule showed in twenty-four hours an abundant growth of *Bacillus anthracis* and some staphylococci.

As soon as the patient was admitted, his wife was sent for and asked bring along the shaving brush. Cultures were made on agar from the brush. *Bacillus anthracis* and staphylococci were demonstrated. The blood culture revealed *Bacilli anthracis*.

A *post mortem* examination was made. There was marked œdema on the anterior thoracic wall and neck. It was very hard and brawny and was about 5 cm. in thickness. The blood was thick and tarry. All the viscera were intensely congested, especially the spleen, lungs and kidneys. The spleen was slightly enlarged and scrapings from this organ were made and stained. The scrapings contained *Bacilli anthracis* mixed with leucocytes, etc..

I wish to acknowledge my indebtedness to Dr. C. J. Weedon, Honorary Surgeon, Brisbane Hospital, for permission to publish these notes.

Reviews.

EXAMINATION OF THE TRACHEA AND BRONCHI.

THE practice of tracheo-bronchoscopy has assumed such an important place in the realm of clinical investigation and therapeutic application that its principles and technique cannot be ignored by practitioners specially interested in the affections of the upper respiratory airways and their adnexa.

The German editions of Mann's "Text-Book of Tracheo-Bronchoscopy" appeared in 1914. It has now been translated and slightly enlarged by the inclusion of further case reports.[1]

In the first section of the book the history of the development of the endoscopy of the tracheo-bronchial tree is traced and the technique and instruments of the various schools described and freely illustrated, preference notably being accorded to that of Killian's school.

Mann considers that the sitting position is the one to be preferred as a rule during the manipulations. Local anæsthesia is usually favoured. He himself employs cocaine with adrenalin applied on a brush. He allows that a preliminary injection of morphine may be advantageously employed when the bronchial mucous membranes are chronically inflamed, when a foreign body has long been present or in cases of bronchiectasis, but is adverse to the addition of atropine. He makes enthusiastic reference to Ephraim's discovery of the value of a 1% solution of the double salt of quinine and urea, especially when combined with a 1‰ solution of adrenalin chloride, for anæsthetizing the trachea and bronchi.

The second section of the book, which comprises over two-thirds of the whole, is devoted to a study of the practice of tracheo-bronchoscopy. It deals with the extraction of hard, soft and animal bodies from the air passages, with general diseases and tumours of the trachea and bronchial system and with lesions of these structures due to disease of neighbouring parts. An extensive bibliography is incorporated in this section and greatly enhances its value. The details of a large number of cases reported by various operators have been included and the symptoms found and technique adopted are discussed. The author refers to the considerable success obtained by Ephraim in the treatment of bronchial asthma by the injection into the bronchi by means of his flexible spray under guidance of the eye, of five to seven cubic centimetres of a solution containing 2% of novocain and 10% of adrenalin chloride (1: 1,000) in physiological saline fluid.

The third section of the book is composed of well executed coloured plates of valuable pathological specimens. These, while primarily designed to continue and complete the author's "Atlas of Tracheo-Bronchoscopy," published in 1911, serve as excellent material for the demonstration of the previous text.

There is, in addition, a series of coloured bronchoscopy pictures taken from life at various levels, on corresponding scales, in healthy and diseased subjects. These are especially intended to help the beginner. A carefully arranged index completes the volume.

This valuable book is an excellent presentation of the subject, though more particularly from the German point of view. Rather limited reference is made to American contributions to the art of tracheo-bronchial endoscopy and reference to English work is scarcely to be found. Nevertheless, the volume will be found full of interest and profit for the laryngologist. The text has been done into simple and readable English by the translator, the illustrations are numerous and very helpful and the general get-up of the volume is attractive.

[1] "Text-Book of Tracheo-Bronchoscopy: Technical and Practical," by Sanitätsrat Dr. M. Mann; Translated by A. R. Moodie, M.A., M.D., Ch.B., F.R.C.S.; 1920. London: John Bale, Sons & Danielsson, Limited; Crown 4to., pp. 292, with 50 illustrations and 5 plates in the text and 10 coloured plates in the appendix. Price: 31s. 6d. net.

A POPULAR BOOK ON CONSUMPTION.

"TUBERCULOSIS AND HOW TO COMBAT IT," by Dr. Pottenger, of Monrovia, California,[1] adds another to the many books already published in the hope of popularizing a knowledge of tuberculosis. This book differs from most of the others in that it professes to be a summary of friendly talks between the physician and the patient, put in the form of a book, which is written in a pleasant and easy style, making it agreeable reading.

The book may be divided into three parts: The origin of the disease, the treatment and general advice given to persons with arrested disease or disease cured after their discharge.

It is very doubtful indeed if even a very superficial knowledge of pathology will be of much service to patients who are given to morbid thoughts. All that an intelligent patient requires to know is that he suffers from a general disease which runs a prolonged course; that this disease is caused by the tubercle bacillus; that the discharges from any open focus are under certain conditions infectious to his fellow men; that this infectious matter can be easily destroyed; that the sources of these discharges are amenable to treatment and are in many instances healed.

In a manual of this kind the discussion of milk infection is of questionable utility while the views of the best British and American authorities are so much at variance.

The best chapter in this section is that on "The Relationship Between Tuberculous Infection and Tuberculous Disease." The writing of this has been rendered necessary by the scare-producing articles published in the general press on the great prevalence of tuberculosis. On this account it will be read with profit by the laity and the profession.

"The Three Groups of Symptoms" might probably form a nucleus of a contribution to a medical journal, but in an elementary book of this kind it is quite unwarranted.

The division by Pottenger of the disease into different types is ill advised, in that it may tend to overshadow the

[1] "Tuberculosis and How to Combat It: A Book for the Patient," by Francis M. Pottenger, A.M., M.D., LL.D., F.A.C.P.; 1921. St. Louis: C. V. Mosby Company; Demy 8vo., pp. 273 Price: $2.00.

statement made by Sir Robert Philip many years ago that pulmonary tuberculosis is merely a local manifestation of a general disease.

The remarks on rest, exercise, heat, cold, fog and rain could not be better expressed and the uses and limitations of the sanatorium are well put by the author.

A great deal may be said in favour of tuberculin, but it is out of place in a popular book of this kind. That it is a debatable subject he admits by saying: "Now, if we were asked why we should employ tuberculin . . . . when the patient has it already in his system, we are confronted by a question which is difficult to answer."

His advice to discharged patients is good.

The best chapter in the whole book is that on climate. In it the author expresses views which are moderate and altogether free from bias. It redounds much to his credit, considering that he has spent a quarter of a century in one of the most favoured climatic spots in California. As he expresses it: "I would rather be treated intelligently in the worst climate than run wild in the best."

Altogether this little book will be of use to the author's patients, but it would have been better if the title were expressed as a guide to discharged patients of Monrovia.

The publishers are to be complimented on the general get-up of the volume and on the excellent printing.

Analytical Department.

CHLOROZONE.

"CHLOROZONE" is a liquid "disinfectant and germicide" manufactured by the Commonwealth Chemical Company Proprietary, Limited, of 414, Flinders Lane, Melbourne. Its action depends upon the presence of sodium hypochlorite, which is made from sodium chloride by electrolysis. There is also present a colouring substance which is said to be advantageous from the standpoint of manufacture and storage.

Manufacture.

Sodium chloride solution, approximately 10% concentration, is made in bulk in a wooden vat. The salt is weighed and is placed together with the colouring substance in a canvas bag. The canvas bag is immersed in water of a known volume. The bag acts as a filter, so that when the solution is complete, the outside fluid is clear. The brine with colouring matter is then allowed to flow continuously in a regulated stream through two electrolytic cells. These cells are made of soap-stone and the electrodes are of graphite. The constant current, taken direct from the main, is led through these two cells in series and the path of the current is increased in each by the presence of glass plates, parallel with the electrodes and sunk in the slowly moving solution. Our inspector reports that nothing was found in the process of manufacture to which objection could be taken on the score of cleanliness or proper precaution.

Constituents.

The crystalline salt used in the process was found to contain small amounts of calcium and magnesium, as well as traces of sulphuric acid. The standard of purity was nevertheless high and quite adequate.

The colouring substance contained more than a trace of impurity, but comparison with the same substance obtained from a well-known firm of good repute in Melbourne, showed exact equality of proportion of the colouring matter and impurity.

The water used was unfiltered from the main.

Analysis.

A sample of "Chlorozone" manufactured under inspection was collected for analysis. The results were compared with the results of an analysis of samples purchased in the open market.

The amount of residue after drying 100 grammes at 110° C. was 11.49 grammes. After ignition at a dull red heat, the amount was 11.19 grammes per 100 grammes of original fluid.

Estimates of the free chlorine by the sodium arsenite method gave on an average of six analyses of the collected sample a concentration of N/4.7. The amount of free chlorine in two bought samples was N/10.2 and N/10.4, or less than half that of the sample taken at the works.

The carbolic coefficient estimated by the Rideal-Walker method of the sample taken at the works was $^1/_{10}$ and of a bought sample $^1/_{22}$, or less than half of the former.

There can be little doubt that this difference between the collected and the purchased samples has been mainly due to deterioration of the product on keeping. Inquiry showed that the bought sample had been at least three months in the retail establishment. The corks showed considerable erosion. Considerable deterioration took place in the sample collected by our inspector after it had been kept for a week and the cork had been withdrawn for a few hours. At the end of this period it was found to contain 0.7 of the original amount of free chlorine.

Precautions in Manufacture.

There is no chemical testing of the product at the factory. The brine is made up to a constant strength and the amount of electrolysis is estimated by the temperage of the solution. An additional check is afforded by the ampèrage of the current used. These act as a rough criterion. Our inspector suggests that the amount of free chlorine in the manufactured product should be estimated chemically. The sodium arsenite method could be carried out by the well-trained and intelligent young man directing the process.

The colouring matter is present in "Chlorozone" in weak concentration. The amount found on analysis corresponded with the figures of the manufacturers. In strong solution this substance acts as an irritant poison. Our inspector recognizes that its poisonous action in "Chlorozone" is reduced to a negligible degree. He does not feel justified in advocating its use for cleansing babies' bottles or indeed in connexion with any containers for human food. If the nature and amount of this substance in "Chlorozone" were divulged, it might be left to the individual members of the medical profession to decide whether and in what circumstances "Chlorozone" could be used as a gargle or mouth wash. Until this is done, the proper course for safeguarding the public would seem to be in disallowing the admission of "Chlorozone" to the human alimentary canal.

From the information obtained at the inspection and by analysis we have formed the opinion that "Chlorozone" possesses the deodorant and antiseptic properties of the hypochlorites when in a fresh condition. If the product were tested chemically for the concentration of free chlorine and the labels bore the date of manufacture, the medical profession could rely on this preparation. It should, however, not be used in addition to food, as an application to the human mouth or for the purpose of cleansing containers of human food.

THE SUDAN UNITED MISSION.

THE following letter has been received by the Council of the Victorian Branch of the British Medical Association from the Honorary Secretary of the Sudan United Mission, ALEC. S. EGGLESTON, Esquire. At the request of the Council, we reproduce the letter in the hope that it will enlist the practical sympathy of our readers.

"I have been asked by the executive of the Sudan United Mission to enlist your kind help in connexion with the securing of a supply of surgical instruments for the medical work on our field in the Sudan.

"It was thought by our committee that probably there would be a good many doctors who had instruments which, so far as work here is concerned, are obsolete, but which would be quite good enough for many of the operations which have to be performed in the Sudan and would represent a tremendous advance on the efforts of the medicine men. We should be very glad indeed to receive any gifts which members of the profession might be included to make to us and can assure you that they will be used most gratefully by our doctor on the field and by any others who go out to help him.

"If you could assist by making this known amongst the members of the profession, I should esteem it a personal favour."

The Medical Journal of Australia

SATURDAY, NOVEMBER 26, 1921.

Industrial Hygiene.

Various circumstances operating more or less simultaneously have determined a special object of this issue. It is to direct the attention of the medical profession to a much neglected branch of hygiene, namely, that concerned with industrial life. In the first place, the Executive Committee of the Australasian Medical Congress, Brisbane, 1920, being compelled to set a limit to the material that can be published in the *Proceedings*, generously offered to this journal a masterly essay by Mrs. Osborne on the condition that an abridged *résumé* be prepared for the *Proceedings*. This article, notwithstanding the fact that it was written and read more than a year ago, will stand as one of the most important studies ever undertaken on the position of women in industrial life. The exceptional nature of the work of which she writes, and the urgent necessity of maximal production, even at the expense of the health of the workers, render the experiment doubly valuable, since its protocol contains information concerning the effect of the hardest manual work on girls and women, as well as guidance for preserving the health of women workers in the productive industries. Mrs. Osborne's eloquent advocacy for humane and adequate treatment of women employees must bear fruit in industrial activities in peace time. Her article is the classic on which industrial hygiene as it applies to women will be based.

The second circumstance is the birth of a serious effort to introduce industrial hygiene into Australia. Included in the programme of the recently formed Department of Health of the Commonwealth is the establishment of a section of industrial hygiene. The offer of the International Health Board of the Rockefeller Foundation to lend to the Commonwealth an expert in this branch of preventive medicine has been accepted and Dr. Lanza is now working with the Department. A study of the health condition of young women employed in Australian industries has been inaugurated; the great firms in the Commonwealth are being invited to institute welfare centres and clinics in connexion with the factories and large retail establishments. Information is being sought concerning the care of the worker from a health point of view. Incidentally, problems of prophylaxis of infective diseases among industrial communities will be studied as opportunity arises.

The Technical Commission of Inquiry at Broken Hill has now completed its investigations and the report of an unprecedented examination of workers in a large mining centre will be published within a short time. We have no desire to anticipate the findings of this Commission, but merely wish to call attention to the significance of the fact that science and industry have met for the purpose of determining the risks in a certain class of mining activity and the measures to be adopted to reduce these risks to a minimum. In the present issue we deal at some length with a very valuable report issued by the Board of Trade of New South Wales on the dangers of lead poisoning in the manufacture of white lead and in the painting trade.

Hitherto there has been no real control of the industries in the Commonwealth in regard to their hygienic aspect. Certain requirements have been imposed and the worker has been protected by the provisions of the several *Workers' Compensation Acts* against financial loss resulting from accident or disease arising in the course of employment. Industrial hygiene is a much wider matter than the mere compensation of an injured or incapacitated worker. It is, of course, necessary that the individual should have access to medical or surgical care. Under the *Factories Act* of Great Britain standard protective arrangements have to be applied to machinery in order that accidents may be prevented. The most elaborate provisions have been devised in connexion with the cotton spinning trade. Apart from the prescription of guards in this particular industry, regulations have been drawn up with a view to the reduction of the incidence of infection through habits, like "shuttle kissing," which workers adopt to save labour and energy. Smoke

abatement and the control of dust have engaged the attention of the Factory Department of the Home Office under the old conditions before the establishment of the Ministry of Health. The names of Sir Arthur Whitelegge, Dr. Legge, Dr. Collie, Miss Anderson, Miss Dendy and Mr. Duckering may be mentioned as the most prominent in the small army of industrial hygienists of the old country. These men and women and many others have been exerting their energies as pioneers in a highly important public undertaking. They have achieved the preliminary work and have strengthened the foundations on which they proposed to build, by seeking and obtaining the collaboration of scientific workers like Sir Thomas Oliver, Sir Kenneth Goadby and Sir Frederick Mott. The definite establishment of an extensive and comprehensive scheme of industrial hygiene has been secured. In America and other countries much good work has been accomplished and the data are available for the Australian pioneers to utilize to advantage. Industrial hygiene must embrace, first and foremost, the prevention of diseases, poisoning and accidents caused by the processes of manufacture or by the nature and environment of the employment. In the next place, it must provide for the general safety of the communities engaged in each industry, both by measures calculated to reduce the incidence of communicable and preventible diseases and by the institution of healthy environment for the workers. The third activity of industrial hygiene is concerned with the regulation of the amount of work any individual may perform within a given time in each industry. The interests of the employers as well as those of the employed must be taken into consideration, for it becomes impossible to preserve and improve the health of a community unless the prosperity of the nation is safeguarded by the stabilization of the national productive industries. On the other hand, it is necessary to realize that if it be discovered that the health of the workers in a given industry suffers when they are allowed to work for more than a certain number of hours in a week, the employment of the workers for more than the prescribed number of hours must be prohibited, even if the employers are prepared to pay generously for overtime. It is a function of industrial hygiene to ascertain for each trade the effect of continuous occupation for varying periods on the health of the average worker. In addition, there are numerous important special problems, such as the maternity problem, the question of organized physical training and healthy amusement and the alcohol question, which demand earnest and scientific study. There is much work to be done and success will be attained only if the workers are many and competent.

PRE-MATERNITY CARE.

CHILD-BIRTH is a physiological process and as such should be as safe as eating, drinking and sleeping. Pregnancy, parturition and the puerperal afterperiod, however, render a woman more susceptible to various noxæ than she is under ordinary conditions. The physiological balance of the ductless glands seems to be altered by pregnancy, as are the metabolic arrangements of the tissues. The defensive mechanism against infection becomes less reliable during pregnancy and it would seem as if resistance were further lowered by the physiological loss of blood during parturition. Thus existent infections often undergo exacerbation during pregnancy and the puerperium and septic infections are frequently initiated during child-birth. Experience teaches that some of the dangers attendant on parturition are the result of the altered physiological adjustment of the body during pregnancy and are thus traceable to the presence of some manifest disease or to a tendency to a pathological condition. Other dangers are caused by the incautious and inexpert interference with Nature's methods of delivery. Foolish man, in his endeavour to help the travailing woman, transforms a susceptibility to infection into a declared infection.

The modern obstetrician, recognizing that his aid must be extended with caution and judgement, asks his clients to give him a watching brief. As soon as a wise woman realizes that she is pregnant, she consults her obstetrician and is prepared to follow his directions throughout the long months of her *grossesse* until she and her infant can be left to enjoy life and health as the world's most useful citizens. This is the action of the wise woman.

The French employ this phrase—*sage femme*—for someone quite different. The midwife or *sage femme* is not competent to safeguard the pregnant woman at this stage. A thorough knowledge of physiology and pathology is needed and there must be preparedness to apply special measures in the event of a pathological condition being discovered. It may not be practicable at the present time to make provision for the delivery of every woman under the guidance of a trained medical practitioner. But it is within the bounds of practical politics to enable every pregnant woman to undergo observation by a medical practitioner during the second half of pregnancy. Pre-maternity clinics can be established in our cities and country towns, while arrangements can be made with general practitioners in out-back districts for the occasional examination of all pregnant women. Even under the most unfavourable circumstances a sample of urine could be forwarded once a month for examination to the patient's usual medical attendant or in the absence of a usual attendant to the nearest pre-maternity clinic. It must not be assumed that the examination of a sample of urine is all that is required in the course of the pre-maternity supervision. A careful physician will be loath to dispense with the opportunity of close observation of the woman whose well-being he is endeavouring to safeguard.

The fruits of modern aseptic obstetrics, by which is meant the total avoidance of vaginal examination for the determination of the presentation and the lie of the fœtus and the management of all labours on the principles of aseptic surgery, cannot be gathered unless the obstetrician has the opportunity of anticipating difficulties and of preventing dangerous situations. Many of the most dreaded complications of parturition can be prevented or at least robbed of their most disastrous consequences if they can be attacked at an early stage. It has been stated that maternity is the most important and most profitable industry of the human race. The industry should be protected by the application of real hygienic principles. The only way this can be effected with certainty is by the establishment in every convenient district of well-equipped pre-maternity clinics placed in the charge of competent obstetricians.

WHITE LEAD AND TURPENTINE.

On another page we publish a summary of a remarkable report of the New South Wales Board of Trade on white lead as used in the painting industry. Within the last few days a cable has been published in the daily newspapers from Geneva, intimating that the International Labour Conference at its third session has recommended the prohibition of the use of white lead for indoor painting. It appears that a *questionnaire* had been issued from the International Labour Bureau in Geneva on this matter. The first question included is as follows:

> In view of the fact that it is now technically possible to replace white lead in painting by efficient substitutes, are you of opinion that a draft convention prohibiting the use of white lead in painting should be submitted to the conference?

This question contains a statement which several witnesses of experience in the manufacture of paint controverted in their evidence before the Board of Trade of New South Wales. As this is a matter for industrial experts, it would be highly inexpedient were an opinion expressed in these columns. The fact remains, however, that some persons competent to form an opinion declare that an efficient substitute for white lead as a basis of paint has not been discovered and more specially that zinc white cannot replace white lead in the manufacture of paint.

In order to arrive at a decision whether it is desirable or necessary to prohibit the use of white lead in paint, consideration must be given to the physiological effect of working with lead-containing paints, of manufacturing white lead and of handling material covered with lead paints. The report of the Board of Trade contains a very excellent *résumé* of the knowledge possessed at the present time on the toxicology of lead. Much of the information has been drawn from the written works of Legge and Goadby, the greatest authorities on the subject. The evidence of Professor H. G. Chapman and of Dr. S. A. Smith contributes a wealth of information of great importance. The Board ascertained from these and other sources that absorption of lead and lead poisoning are not the same thing. All authorities are agreed that the most important channel of entrance of lead into the human system is the respiratory tract and that, at all events as far as paint manufacturers and painters are concerned, the absorption of lead follows usually on the inhalation of lead dust rather than the inhalation of vapour or the swallowing of dissolved or particulate lead. The discovery of this important fact dates back over a dozen years. Before it was recognized that minute particles of lead could be taken up by the leucocytes from the alveolar tissues, it had been demonstrated that the determining factor in the toxicological action of the heavy metals was the relation between the surface of the metallic substance and the surface of the absorbing area. The chemical combination of the metal at the time of application is of small moment, for it has been found that, before absorption can take place, the form must undergo change within the body. If a soluble iron salt be injected subcutaneously, the metal is soon held in

an amorphous mass in the tissues under the most unfavourable conditions for absorption. On the other hand, the sulphide of iron or nickel, if in a state of very fine division, which means a very large surface of metallic salt, when introduced into the peritoneal cavity, is rapidly converted into a compound of a highly toxic nature. The respiratory surface is incomparably the largest absorption surface in the body. The inhalation of air containing very finely divided metallic particles, no matter whether in the form of soluble or insoluble salts or of the metal itself, presents the optimum conditions for rapid absorption of metal and the full exercise of its toxicological action. It is pointed out that the average diameter of the particles of lead present in the air in industrial processes is about one micron. Neither Goadby nor Professor Chapman appear to have considered the effect of the absorption of particles of metal or its salts in a state of much finer division than this. If the hydrate of iron be reduced under favourable conditions, an impalpable powder results, of which the largest particles are probably less than 0.25 μ in diameter, while the smallest appear under a high magnification as minute specks. It would seem to us that one of the reasons why lead poisoning is relatively infrequent among painters is that the dust inhaled as a rule does not represent lead in a very finely divided condition in the sense mentioned above. It might be argued that this would not account for the occasional occurrence of lead colic or wrist drop or albuminuria in lead workers whose companions working under exactly the same conditions escape. If the dust be mixed, that is, if some of the particles are very small, while the average size is relatively large, some men would absorb a toxic dose as a result of leucocytic activity and rapid chemical change, while the average man would harbour depôts in his alveoli from which particles would be but slowly removed.

It is a significant fact that lead has been found in the lungs of every Broken Hill underground worker who had died of some other affection and had been examined after death. This fact means that in the mine dust at Broken Hill the particles are relatively large. When an animal is poisoned with iron or nickel carbonyl, a metallic basic carbonate is deposited in a state of extremely fine division on the immense surface of the respiratory area. During the first few hours the lungs contain considerable quantities of the metal. After three or four days the metal has either disappeared altogether, or a mere trace is retained. In these instances the relative proportion between the surface of the metallic particles and that of the absorbing area is at its optimum.

The next question of importance that transpires from the report, as far as the toxicology is concerned, is the lethal dose of lead. Dr. Alice Hamilton and other authorities have arrived at the conclusion that 100 milligrammes per kilogram of body weight have to be taken into the body before acute poisoning results. Harnack found in 1878 that fatal acute lead poisoning resulted in dogs after the absorption of five to six milligrammes per kilogram of body weight. Frogs and rabbits are less susceptible. It is highly probable that if the lead were introduced as dust into the lungs in such a condition that the whole amount could be absorbed rapidly, the lethal dose would be found to be much smaller than 100 milligrammes for each kilogram of body weight. This would mean for a man of average weight that seven grammes of lead would have to be absorbed. Dr. Hamilton found that it was possible to remove from the hands of a tapper in a blast furnace at a lead works 62.5 milligrammes of metal. On the other hand, she found that over one gramme of lead as dust could be inhaled each day. If it were permissible to draw conclusions by inference from the experimental evidence with iron, the complete absorption of two grammes should produce fatal results and the absorption of one gramme should give rise to acute poisoning. Fortunately for the industrial workers in lead, the complete absorption of the metallic dust inhaled is a practical impossibility.

The evidence of Goadby and Legge shows quite clearly that the toxic symptoms observed in painters is more frequently caused by the action of turpentine than by that of lead. Professor Chapman was unable to give exact information concerning the effect of small quantities of turpentine in human beings. It appears that Schulz carried out a series of experiments with young men in 1900. He gave them small doses daily for long periods and observed a certain degree of mental hebetude and apathy, together with an increasing feeling of tiredness. Muscular weakness appeared after a time and was often accompanied by painful sensations in the stomach and eructations. In predisposed persons renal symptoms occurred. These included albuminuria and hæmaturia. Kunkel made special investigations among persons employed in closed rooms containing the vapour of the oil of turpentine. He found signs of slight poisoning, but was unable to convince himself that any definite renal damage resulted. The information concerning acute turpentine poisoning is more definite. Cardile, Purkinje and Verbreughen are usually quoted as the most reliable authorities on the subject. From the evidence given at the inquiry, it would appear as if the various witnesses did not distinguish between poisoning by turpentine and poisoning by lead, except that the former has a more rapid action. It is a pity that it was not explained more clearly that the heavy metals act primarily on the capillary endothelium, inducing a necrosis and later a fatty degeneration, while turpentine produced an immediate hyperæmia, but little ultimate destructive change. The hyperæmia affects the organs as a whole. If it is intense, it may lead to stasis in the capillaries and thus indirectly to those mechanical and chemical changes which follow in the wake of congestion. In the lungs and in the kidneys a secondary inflammation of the parenchyma no doubt may follow. As a rule, in fatal acute poisoning, the symptoms include anæsthesias, cyanosis, slowing of the respiration and of the heart beat, convulsions and coma. There seems to be no doubt that these general effects are produced by the action of the dissociation products of the turpentine. Various

bodies, including paired glucuronic acid, have been isolated from the urine of poisoned dogs.

The lesson to be drawn from the information collected at this inquiry is that lead poisoning is easily prevented, at all events in so far as painters, white lead workers, printers and smelters are concerned, by the removal of excessive dust or vapours. It must be recognized that the amount of lead ingested through the gastro-intestinal tract that can cause symptoms of poisoning is considerable and that Dr. S. A. Smith is justified in adopting a very sceptical attitude toward the alleged cases of plumbism reported from Queensland. Whether the substitution of zinc for white lead in the manufacture of paint would effect an improvement of the health of painters and others handling paint is an open question.

PERNICIOUS ANÆMIA.

Much fruitless speculation has been made in regard to the cause of Addison's anæmia. Research on the subject has proved up to the present to be the pursuit of a will-o'-the-wisp. Chronic infection of the teeth, intestinal parasites, primary infection of the spleen, intestinal sepsis and infection of the bone marrow have each been regarded from time to time as likely to reveal the immediate cause of the disease. Yet, as Sir William Osler pointed out, we have not advanced far beyond the knowledge of Addison, who described the disease as "a general anæmia occurring without any discoverable cause whatever; cases occurred in which there had been no previous loss of blood, no existing diarrhœa, no chlorosis, no purpura, no renal, splenic, myasmatic, glandular, strumous or malignant disease."

Dr. William J. Mayo, of Rochester, has recently contributed an article on the relationship of the spleen and the large intestine to pernicious anæmia.[1] He does not approach his subject with any lightness of heart. What person can speak without depression of a disease which, once manifested sufficiently for diagnosis, has already condemned its victim to a premature grave? Hopes have from time to time been raised that the possibility of cure was close at hand. When Medicine failed to heal, Surgery rose bravely to the attack. Eppinger suggested in 1913 that removal of the spleen might effect a cure. The idea was accepted generally in Germany and America. At Rochester, in Dr. Mayo's Clinic, fifty splenectomies were performed up to November 1, 1917, for definitely established pernicious anæmia. The immediate results were not inspiring. The operation was abandoned and was not repeated for three and a half years. Recently, however, two members of the Clinic investigated the condition of the fifty patients who had submitted to the operation. Ten *per centum* were alive after more than five years. Twenty-one *per centum* survived the operation three years or more. It is argued that in at least one-third of the cases the average life of the patients is prolonged and that in about one in ten the prolongation is sufficient to raise the hope that cure may, in a few instances at least, result. The palliation was much greater following splenectomy than when blood transfusion was the mode of treatment. Transfusion apparently supplied the patients with red cells which lived and performed their functions for one or two months, but led to no obvious prolongation of life. The value of splenectomy appeared to lie in its ability to render the patient more fit for intercourse with his fellow-men and to confer on him a slightly longer lease of life. As one of the functions of the spleen is to destroy red cells rendered inefficient by service, it is assumed that splenectomy puts an end to this destruction and allows the red cells to remain useful although decrepit servitors. It might be imagined that the size of the spleen bore some relationship to the severity of the disease or to the prospects of cure. But no such relationship was established. In aplastic anæmia of the pernicious type the spleen is commonly small. Dr. Mayo does not attach much significance to the belief that the spleen may be the primary seat of the disease. He prefers to believe that the same agent which affects the spleen, destroys the bone marrow, injures the spinal cord and produces achlorhydria and glossitis and that by the operation of splenectomy a vicious circle is interrupted.

Failure to incriminate the spleen as the primary focus in Addison's anæmia served to direct attention to the gastro-intestinal canal. Dr. Mayo, while deprecating any suggestion by him that the ætiological agents of pernicious anæmia arise in the large intestines, is obviously more than slightly interested in this part of the intestinal tract. He has been struck with the frequency of carcinoma and surgical tuberculosis in the right half of the large intestine and with the associated anæmia, which is much more severe than the anæmia of carcinoma or tuberculosis in any other part of the body. Yet surgical treatment of these conditions has a surprisingly low mortality and a high percentage of cures.

Interest in the possible connexion between the colon and pernicious anæmia is added by the researches of Logan, of the Mayo Clinic, on infections with *Balantidium coli*. This organism is a flagellate parasite which is in rare instances found in the intestinal wall of man, the blood vessels and other organs. Accompanying the infection are signs indistinguishable from those of pernicious anæmia. And the pernicious anæmia of *Balantidium coli* always ends in the death of the victim. Dr. Mayo recognizes that the association of this infection with pernicious anæmia may have been a coincidence. Honest card players, he says, have been known to hold four aces. His views are summed up in his final paragraph: "It behoves us to keep an open mind, to study carefully the blood conditions of all patients who have disease of the large intestine, to try to ascertain whether anæmia, achlorhydria, glossitis or some other abnormal condition exists, and especially to study carefully all cases in relation to cause and effect, in which the large intestine is removed or in which splenectomy is performed." Dr. Mayo walks warily, as every wise man should do on doubtful ground. No convincing evidence has been adduced to raise the hope that the cause of the disease will be located in the large intestine. But it is wise that we should keep an open mind.

[1] *Annals of Surgery*, September, 1921.

Abstracts from Current Medical Literature.

MEDICINE.

(231) Transient Hemiplegia.

WILLIAM H. HOLMES (*Journal of the American Medical Association*, June 11, 1921) has discussed the relationship of increased blood viscosity to transient attacks of hemiplegia. Attacks of transient hemiplegia or of aphasia are not infrequently observed in patients suffering from arteriosclerosis with or without abnormal blood pressure changes. These symptoms are regarded as the result of a disturbance in the circulation of the blood in one or more of the cerebral vessels, the disturbance being of insufficient duration to result in permanent damage to the substance of the brain. Considerable speculation has existed in regard to the nature of a pathological change so severe as to cause a complete loss of function, yet so evanescent as to permit of perfect restoration within a few hours. It has been maintained that such symptoms arise as the result of arterial spasm, analogous to that which occurs in intermittent claudication, Raynaud's disease and similar clinical conditions. The terms "angio-spastic hemiplegia" and "intermittent cerebral claudication" have been used, therefore, to describe the attacks. Exception has been taken to this hypothesis, which rests more or less entirely on conjecture, since there is little evidence, either pathological or experimental, to support the belief that isolated spasm of the cerebral vessels may occur as a result of conditions arising in the body. A more satisfactory explanation of some cases of transient hemiplegia is that the symptoms may result from slowing of the circulation in sclerotic vessels, as a result of lowered blood pressure. The author points out that both of these hypotheses have left out of consideration the influence of changes in the physical character of the blood, of the nature of increased viscosity. From theoretical consideration it is apparent that the resistance offered to the rate of flow of a fluid through a tube must depend not only on the nature, size and smoothness of the lumen of the tube, but also on the viscosity of the circulating fluid. The author maintains that as the viscosity of blood is subject to fluctuation as a result of changes in the salt, colloidal, gaseous and water content or corpuscular concentrations, this factor might be of importance in the production of symptoms. The degree of dehydration which may result from severe diarrhœa, vomiting and other causes may be so great as to constitute an urgent indication for the subcutaneous or intravenous introduction of fluid to restore blood volume and decrease viscosity. It is therefore probable that factors other than decreased head of pressure and narrowing of the vessel lumen require consideration. It is suggested that dehydration of the tissues should be avoided in persons of advanced years who were the subjects of vascular degeneration. The introduction of anti-coagulant salts and of fluid may be indicated in certain cases of transient hemiplegia or aphasia in order to prevent actual thrombosis in vessels when slowing of the circulation is the cause of symptoms.

(232) Tracheo-Bronchial Adenopathy.

R. M. BALYEAT (*Journal of the American Medical Association*, April 9, 1921) discusses the diagnosis and significance of pathological enlargement of the tracheo-bronchial glands. The recognition of tuberculous involvement of the glands at the roots of the lungs is regarded as of particular importance in the case of children who have been exposed to tuberculous infection, as it is becoming more and more widely recognized that adult tuberculosis is in very many cases a recrudescence of an infection acquired in childhood. As a result of the study of 449 children under 16 years of age, the author has endeavoured to determine the importance of physical signs and Röntgen ray findings in the estimation of the degree of tubercular infection of the hilar glands. Special attention has been paid to the significance of D'Espine's sign as an indication of tracheo-bronchial adenopathy and the appearance of the hilum shadows in the skiagram as a means of differentiating tuberculous from non-tuberculous glands. As difference of opinion has existed as to what constitutes D'Espine's sign, it is necessary to have a clear conception on this question. In 1907 and 1910 D'Espine called attention to a sign which he at first thought was diagnostic of tuberculous glands at the root of the lungs, but which he finally concluded was indicative of enlarged tracheo-bronchial glands due to any one of several causes. In young children the tracheal voice normally ceases at the level of the seventh cervical spine. In cases in which the lymph nodes are enlarged at the root of the lungs the tracheal voice will be heard over the upper thoracic spines when the patient whispers. From subsequent observations of various clinicians the conclusion has been reached that this sign is indicative of a pathological process at the root of the lung, the glandular enlargement being caused by tuberculosis, malignant disease, leuchæmia, lymphadenoma, syphilis or any infectious disease of the lungs. As a result of his own observations, the author has concluded that a positive D'Espine's sign is indicative of enlarged glands at the root of the lung, the enlargement being due to any of several causes, the chief of which is infection by the tubercle bacillus. If the glandular enlargement is the result of tonsillitis, whooping cough or measles, the increase in size is usually insufficient to give the sign. Chronic bronchitis may also produce enlarged tracheo-bronchial glands, but the enlargement due to this and other simple inflammatory lesions can usually be differentiated from a tuberculous process by radiographic examination. The importance of the early recognition of tuberculous involvement lies in the fact that affected children should be placed early in proper hygienic surroundings, with the object of assisting the arrest of the disease.

(233) Aortic Lesions.

E. GOYNAROFF (*Medical Record*, March 26, 1921) has reviewed the literature on the subject of aortic lesions and has described 46 cases from Bard's Clinic, in Geneva, in which the question of a syphilitic cause for aortitis, aortic aneurysm and aortic incompetence was carefully investigated during life and after death. About the year 1860 Aitken noted that syphilis was the cause of 17 out of 24 cases of aortic aneurysm. About 1897 Gron found a history of syphilis in 14% of 3,728 patients who died of aortic aneurysm and on whom autopsies were performed. In 1914 Moncaud obtained a Wassermann reaction in seven out of ten cases of aortic aneurysm, in two out of four cases of aortic insufficiency, in three out of six cases of aortic stenosis, in one out of three cases of aortitis and in four out of eight cases of multiple lesions. Goynaroff obtained the Wassermann reaction in two out of three cases of aortitis, in 21 out of 33 cases of aortitis in subjects unaware of syphilitic infection, in three out of three cases of aortic aneurysm and in three out of seven cases of atheromatous lesions of the aorta. He is of the opinion that several cases of aortic lesions, until now regarded as syphilitic, simply because the Wassermann reaction has been obtained, are not in reality the result of syphilis, because, as Bard maintains, aortitis and atheromatous patches are able in themselves to create antibodies capable of fixing the complement.

(234) Bilirubinuria.

M. BRULÉ AND H. GARBAN (*La Presse Médicale*, July 6, 1921) state that bilirubin exists normally in the urine in small amounts and that an increase of this substance in the urine indicates a pathological state, due to or associated with hepatic insufficiency. In their recent researches they employed the following test to determine the presence of bilirubin. To 10 c.cm. of urine 10 c.cm. of 95% alcohol and a pinch of zinc acetate are added. The solution is filtered and the filtrate is examined. If it is fluorescent by daylight, the bilirubin is present in the urine in abnormal quantity. Physiological bilirubinuria only causes fluorescence by transmitted light in the dark. The authors consider that bilirubin is normally present in the blood and urine and that excess of bilirubin passes the liver, which usually breaks it down, and is excreted in the urine. These observations are of value clinically for the investigation of hepatic insufficiency and minor degrees of jaundice.

NEUROLOGY.

(235) Regional Heteromorphisms of the Spine.

ANDRÉ ROCCAVILLA (*Revue Neurologique*, January, 1921) writes on the subject of congenital heteromorphisms or abnormalities of the vertebræ which give rise to nervous symptoms and often remain wrongly diagnosed until X-ray examination is made. Such abnormalities occur at certain levels, namely, between the cranium and the atlas and between the cervical and dorsal, dorsal and lumbar, lumbar and sacral and sacral and coccygeal vertebræ. The anatomical fact is that the characters of the vertebræ at these levels are unstable. Thus the seventh cervical vertebra may assume some of the characters of the first dorsal vertebra and so on. Now the clinical importance of these malformations is unequal. For instance, occurring at the dorso-lumbar junction, they may give rise to no symptoms. At the cervico-dorsal junction, on the other hand, the signs of cervical rib are well known. It is not so well recognized that changes at the atlanto-occipital and the sacro-coccygeal joints are sometimes responsible for neuralgic troubles, while, lastly, the signs of lumbo-sacral malformations are even less known and it is with these that the writer specially deals. Here the fifth lumbar vertebra assumes sacral characters, it undergoes sacralization, the transverse processes spread out in butterfly form and may fuse with the iliac crests, giving a striking radiographic picture. In consequence, certain nerves suffer, in particular the fifth lumbar and less frequently one or two nerve roots above and below. Pain is the chief symptom. In slight cases it is lumbago-like, in others it is paroxysmal, intense and radiating. Tender points may be found where the fifth lumbar and first sacral roots emerge. Strips of cutaneous anæsthesia or hypoæsthesia running down the back of the leg from buttock to peroneal region, or in the distribution of the fifth lumbar root may also be discovered. Since this abnormality is found to occur in 4% of all persons, its diagnosis is important. Rheumatism, Pott's disease, sciatica and stone in the ureter come to mind as possibilities until X-ray examination determines the diagnosis. Treatment is unsatisfactory. In slight cases instructions are given to avoid movements which aggravate the malformation. In worse cases immobilization and surgical measures (removal of the offending bone) must be considered.

(236) The Pathogeny of General Paralysis and Tabes Dorsalis.

A. SEZARY (*Revue Neurologique*, April, 1921) offers a new theory of the pathogenesis of general paralysis and *tabes dorsalis*. He states that the lesions of the nervous system in these diseases are in several ways comparable to those provoked by syphilis in a non-immune body. It would appear that in nervous tissues the action of syphilitic antibodies is annihilated. This is in accordance with other facts of general pathology, which suggest that the central nervous system constitutes a territory outside the ordinary rules of immunity. For example, in the case of animals already immunized against tetanus and other toxins, if further toxin be taken and injected into the brain a positive instead of the expected negative reaction will occur. The conclusion is that the nervous system, by reason of its chemical constitution or the possession of some reducing power, does not feel the effect of immunizing substances introduced in ordinary ways. The outcoming theory, as applied to general paralysis and *tabes dorsalis*, is that nervous tissues primarily have a certain natural immunity against the spirochæte. But this immunity does not confer complete protection. It only retards the development of the noxious organism. After the secondary period the nervous system does not share that immunity which the rest of the organism has acquired as the result of infection. The spirochætes which have previously invaded it and there found a refuge, adapt themselves, pullulate and finally determine lesions which are atypical because they escape the humoral factors which govern classical syphilitic processes. The theory takes cognisance of the difference between vascular and parenchymatous syphilitic changes in the nervous system, emphasized by others, and the writer holds that it explains the incurability by present-day methods of *tabes dorsalis* and general paralysis.

(237) The Early Recognition and Treatment of Tabes Dorsalis.

E. FARQUHAR BUZZARD (*Proceedings of the Royal Society of Medicine*, December, 1920) states that it will be agreed that, in a large proportion of unmistakable cases of *tabes dorsalis*, inquiry will elicit a history, often extending over five, ten or more years, of pains which have been regarded as neuritic or rheumatic in origin and have not been associated with any other disability. Such pains often are the earliest signs of tabes and can be distinguished from pains of other origin. They are like the stab of a knife or a darning-needle, or they resemble the effect produced by taking up the flesh, pulling it and letting it go again. They are rapidly repeated and paroxysmal. Favourite sites are the heel, the inner aspect of the shin and knee. The area within which the pains are repeated, is small. Between paroxysms these areas are often tender to light touch. The tabetic suffers from other pains, deep, gnawing and aching, and other subjective phenomena, but these are not pathognomonic. In treatment Buzzard maintains that the only honest advice medical men can give to patients suffering from any syphilitic disease, is that they should continue to have periodic courses of treatment for the rest of their lives. "After many years of critical study of this problem, I am convinced that the lightning pains of tabes are, for practical purposes, pathognomonic, and that they can and should be recognized before they are many months old. Treatment initiated before physical signs are apparent is likely to be attended by good results if persevered with."

(238) Lesions of the Brachial Plexus Associated with Rudimentary Ribs.

PERCY SARGENT (*Brain*, July, 1921) writes that variations in the composition of the brachial plexus are apt to be associated with costal abnormalities, pre-fixation, *i.e.*, failure of the first dorsal contribution, with a seventh cervical rib, and post-fixation, *i.e.*, a large contribution from the second dorsal root, with an abnormal first thoracic rib. Of the different cervical ribs met with clinically, that which most frequently calls for operation, is an abnormally large non-jointed costal process, continued onwards as a dense fibrous band, to be attached to the first thoracic rib behind the *sulcus nervi brachialis* (*sulcus subclaviæ*). Symptoms gradually arise from continual slight traumatism to the eighth cervical root or lowest cord of the plexus, caused by the tightening of the band during respiration and in certain movements of the arm. With a post-fixed plexus, symptoms referable to the first thoracic root may be caused by the pressure of a normal first thoracic rib. "Vascular symptoms" are vasomotor in origin and result from injury to sympathetic fibres. The results of operative treatment in fifty cases are given, the majority having been traced for a period of from two to twelve years. Pain was cured in nineteen cases and relieved in eight. Muscular wasting was cured in twelve cases, relieved in twelve and unrelieved in seven. Vasomotor symptoms were cured in fourteen cases, relieved in six and unrelieved in two.

(239) The Fixation Function of the Cerebellum.

NOICA, of Bucharest (*Revue Neurologique*, February, 1921) offers a new view on the function of the cerebellum in relation to voluntary movement and illustrates his point with a carefully studied case of unilateral lesion of the cerebellum. He says that voluntary movements demand fixation of the body or portions thereof adjoining the part to be moved. One important function of the cerebellum is to bring about that fixation. For example, it is known that a patient with a cerebellar lesion cannot rapidly pronate and supinate the forearm (Babinski's adiodocokinesia). Now, Noica's observation is that if this patient's shoulder and upper arm be fixed against the back of a chair or his side, he can perform the movement normally. Similarly, he may be unable to draw circles on a blackboard unless the trunk be fixed, or handle a fork, spoon, etc., unless the elbow be fixed. In many other ways the incoordination of movement may be overcome. Hence adiodocokinesia indicates loss, not of ability to execute these particular rapid movements, but of ability to fix other parts upon whose stability these movements depend.

Special Abstract.

THE WHITE LEAD INQUIRY.

THE BOARD OF TRADE OF NEW SOUTH WALES has issued a voluminous report on an inquiry held into the question whether white lead as used in the painting industry is so injurious to painters or other workmen engaged in this industry that it is expedient or necessary to regulate, restrict or prohibit its use in paints or pigments. The Board had before it the *questionnaire* of the Geneva International Labour Bureau dealing with the proposed prohibition of the use of lead in paints. The report and evidence, together with the several appendices, cover 778 pages of royal octavo.

In the introduction to the report the Board finds that no legislative or other measures are at present in force in New South Wales aiming at the diminution or removal of the danger of lead poisoning in house painting. The number of house painters, paper hangers, glaziers and sign writers enumerated in the 1911 census was 5,638. The return in the 1921 census is not yet available. The number of cases of plumbism among house painters is not known. Figures are given of the number of persons employed in silver-lead and zinc mines, in lead corroding works and in zinc factories.

The Toxicity of Lead Compounds.

In introducing the subject of the chemical and physiological aspect of the problem, the Board states that white lead is usually a basic carbonate of lead, although a basic sulphate of lead is at times used as the white pigment of paint. The poisonous qualities of a lead compound are said to be determined, firstly, by the size of the particles and consequently by the ease with which these particles can be disseminated through the air and, secondly, by the solubility of the particles in the body fluids. It is further stated that both lead carbonate and lead sulphate produce toxic symptoms when given in quantities of 0.1 gramme per kilogram of body weight per day. Evidence of the toxicity of lead sulphide is presented by Professor H. G. Chapman and Dr. S. A. Smith.

The Absorption of Lead in the Human Body.

Expert witnesses, as well as the authorities quoted by them, agree that lead may be absorbed into the body through the respiratory system, through the stomach and through the skin. The chief cause of lead poisoning is dust or vapour. The inhalation of lead dust is more dangerous than the ingestion of lead compounds. It is stated that the particles in the air in industrial processes measure on the average 1 μ in diameter. In the case of painters there is no danger from lead vapour, since the vapour pressure of lead salts at room temperature is practically nil. Lead may be ingested through the gastro-intestinal tract in industrial conditions, but the lead is rendered relatively insoluble in the stomach and the greater part of the metal ingested is passed out in the fæces.

The lead dust enters the lungs and in due course is absorbed by the phagocytic cells without producing any fibrosis. The metal is carried by the blood and is deposited therefrom into the tissues of the body. The eventual excretion is by the bowel and to a slight extent in the urine. Absorbed lead remains stored up in the tissues for a long time. This statement is based on the evidence given by both Professor Chapman and Dr. S. A. Smith, who found lead *post mortem* in the lungs of Broken Hill miners who had died from other causes. These persons appear to have carried large quantities of lead in their bodies for several years. Under the conditions of the painting industry, absorption through the skin is quite negligible.

Stress is laid on the varying susceptibility of different people to lead. Several of the witnesses testified to the acquisition of a considerable tolerance to lead as the result of continued exposure to small quantities. Similarly, importance is attributed to the fact that lead absorption and lead poisoning are not synonymous terms. Lead tends to accumulate within the body. Symptoms of lead poisoning are apt to appear in persons suffering from anæmia, renal disease, syphilis, alcoholism, gout, septic conditions of the mouth and inflammatory conditions of the stomach. In the presence of colic, paresis or anæmia the diagnosis is stated not to present any special difficulty. It is noted, however, that the witnesses Professor Chapman and Dr. S. A. Smith maintain that the diagnosis even under these conditions is not always easy and demands experience in toxicology. The colic may be caused by other conditions, as may a wrist drop or the anæmia. Goadby and Legge hold the view that the gradual development of anæmia, extensor weakness and other early symptoms give a safe indication to an experienced physician. There appears to be a difficulty in determining the exact definition of lead poisoning. The Honourable J. B. Nash stated that the blue line is a certain diagnostic sign of lead poisoning, together with the anæmia and weakness. He claimed that if lead were present in the body, lead poisoning must occur. He regarded the blue line on the gums as direct evidence of the absorption of the metal and attributed it to the presence of metallic lead in the mucous membrane. Other witnesses pointed out that it had been proven that the blue line was not a reliable sign of lead poisoning. When present it was produced by the sulphide, but it was frequently absent in lead poisoning; it was usually associated with unclean mouths; it was often simulated.

Forms of Lead Poisoning.

All authorities agree that lead poisoning occurs in three types, the gastro-intestinal, the nervous and the nephritis types. The first occurs usually after short exposure to small quantities of lead. The paretic type is produced by the absorption of large quantities of lead over a comparatively short period, while the arterio-renal type occurs when small quantities are absorbed over a long period. This is the most important form from the industrial point of view. A short description is given of the changes produced in the nervous type. This description includes a reference to the microscopical hæmorrhages arising as a result of degenerative changes on the vascular wall. Attention is drawn to the relationship between insanity and lead poisoning and to the hypothesis that alcohol is a predisposing cause of saturnine encephalopathy. Again the authors of the report quote Goadby's opinion concerning the association of a leucopenia and a lowered tolerance to lead and other metallic poisons. In regard to the nephritis of lead poisoning, it is found that there is no criterion to enable the physician to distinguish this form of Bright's disease from other forms. It is stated that acute nephritic symptoms are commoner among painters than among the workers in white lead factories; that the incidence of gout is greater among painters than among white lead workers, that headache is an early symptom of poisoning in painters, but a late and grave symptom in other lead workers. It is further stated that the blood pressure among painters is higher than that of workers in other industries. The conclusion reached in this regard is that the difference may be caused by the inhalation by painters of turpentine vapour. It is stated that turpentine is a stronger irritant of the kidney than lead and that it works more rapidly. It is said to cause minute hæmorrhages in the renal substance. They claim that it is impossible to distinguish between lead nephritis and turpentine nephritis in persons exposed to both poisons. Acute lead poisoning is nearly always gastro-intestinal, while turpentine poisoning is nearly always renal. This statement is amplified by Dr. S. A. Smith in his evidence. The source of the information is to some extent the recently published experimental work of Sir Kenneth Goadby.

Some highly important evidence is summarized in the report. This is the result of the investigations by Professor Chapman and the other members of the Technical Commission of Inquiry at Broken Hill. Very briefly the points brought out are shown in the following table:

Length of Exposure to Lead.	Number of Men.	Showing Symptoms of Lead Poisoning.	Not Showing Symptoms.
Under 10 years ..	741 ..	9.3% ..	31.7%
10 to 20 years ..	544 ..	12.5% ..	87.5%
20 to 30 years ..	289 ..	33.0% ..	67.0%
Over 30 years ..	123 ..	26.0% ..	74.0%

This is held to indicate that Bright's disease and other manifestations of lead poisoning in men exposed to lead

dust develope very slowly. It was noted that anæmia was not marked in the persons exposed to lead at Broken Hill. It is suggested that the anæmia seen in painters may be attributable to turpentine.

It is impossible to reproduce even in an abbreviated form that portion of the report in which a description is given of Sir Kenneth Goadby's experiments with turpentine, linseed oil, zinc and lead. The details have been published in the reports of a Departmental Committee appointed to investigate the dangers attendant on the use of lead compounds. A very important and highly interesting account is also appended of the work of Dr. Legge, culled from his annual reports as the Chief Inspector of Factories under the Home Office. The practical deductions drawn from these reports are that lead dust produced in the process of rubbing down painted surfaces before a fresh coat of paint is applied is responsible for the dust which causes lead poisoning in painters, that a raised blood pressure and arterio-sclerotic changes are seen in painters who have used no lead and have not exposed themselves to dust from rubbing down and that these symptoms are due to the inhalation of small quantities of turpentine for long periods. Further, it is shown that exhaust ventilation is the proper method of combating the danger from lead dust in painting and other industries in which lead appears.

Statistical Considerations.

Mr. D. T. Sawkins and the State Statistician, Mr. H. A. Smith, have collated statistical information and have presented it in a manner in which it can be utilized for the purpose of the inquiry. In the first place, it was found that the relative frequency of lead poisoning in painters during a seven-year period (1909 to 1915) was 16‰ as compared with 0.4‰ among all bread-winners in Australia. The frequency of Bright's disease among painters is given at 152, as compared with 55.2 for the general population of bread-winners. Returning to the question of mortality, it is pointed out that between 1909 and 1920 there were 72 deaths of males from lead poisoning. Twenty-two of the individuals were painters, nineteen were silver-lead miners, six were labourers, five were printers and compositors and four were plumbers. Based on the census figures of 1911, Mr. Sawkins showed that the estimated death-rate for painters in the years 1909 to 1915 was 12.9‰ and the rate for all bread-winners 12.0‰. Following up his investigations in this direction, Mr. Sawkins found an index of mortality of 15.7‰ for painters and of 12.0‰ for bread-winners. The difference between these two figures is accounted for chiefly by the higher rates for tuberculosis, Bright's disease and dieases of the nervous system. Professor Chapman expressed the opinion after a careful discussion of the figures that the prohibition of the use of white lead would not remove the excess of mortality. He pointed out that the mortality figure for lead poisoning was approximately 0.2%, which he regarded statistically as an insignificant rate.

The Inspector-General of Mental Hospitals had been asked to provide information concerning the incidence of lead poisoning as a causative factor in insanity. The experience of the London County Asylum at Claybury tended to show that there was a higher percentage of insane persons among those exposed to lead than among the general population. Dr. Sinclair showed that of a population of over 3,000 persons at the Callan Park Mental Hospital 130 had been exposed to lead, while only ten had manifested signs of plumbism. Of these ten only five showed definite signs of poisoning.

The statistical and medical evidence is interpreted as indicating that tuberculosis is not more frequently associated with lead poisoning than any chance affection. It appears that the frequency of tuberculosis among painters is not much higher than that among persons of the industrial class. Legge and Goadby failed to find any evidence that lead poisoning predisposed to pulmonary tuberculosis and this opinion appears to be shared by Dr. F. L. Hoffman, an official of the United States Bureau of Labour.

The information collected by the English Royal Commission on Metalliferous Mines and Quarries revealed that, while all dust was injurious to health, dust containing free crystalline silica was an ætiological factor of pulmonary tuberculosis among miners and stone workers. A short reference is made to the findings of the Technical Commission of Inquiry at Broken Hill in regard to the relation between the inhalation of siliceous dust and the appearance of pneumokoniosis and pulmonary tuberculosis.

The Board then gives a short but interesting account of J. S. Haldane's hypothesis concerning the damage done by dust in the lungs. Haldane found that mere hardness was not a determining factor. The chemical composition of the particles did not seem to matter, but their power to adsorb other substances appeared to be very important. Carbonaceous matter possessed this property in a high degree, while crystalline quartz appeared to have very little adsorptive power. Particles that adsorb freely, would exert a stimulating effect on the blood and tissue cells and ultimately the whole of the dust would be removed from the lung. The presence of this power of adsorption would thus account for the relative harmlessness of a mixture of quartz with silicates. It is suggested in the report that the lead dust might provide this adsorptive power and thus prevent the small quantity of silica in the mineral lode at Broken Hill from producing extensive fibrosis of the lung. It is further suggested tnat the amount of silica inhaled by painters being proportionately small, the inhalation of the dust from the process of rubbing down would usually be harmless. Only in these persons who are relatively susceptible to lead, would this dust produce a noxious effect.

The Industrial Aspect.

A chapter of the report is devoted to the evidence in regard to administration and trade experience. An historical account is given of the regulation of hours determined by industrial tribunals. In 1902 the Sydney Trade Union of Painters applied for an award to include a limitation of the number of hours of labour to 44 per week. This was granted in 1904. In 1907 the question was complicated by an agreement between the Union and certain industrial establishments including the provision of a 48-hour week. In 1908, after a strike against the master builders and master painters, an award was registered prescribing 44 hours as the ordinary hours for labour per week, although 48 hours might be worked under certain circumstances. The working hours were not to be more than 48, unless overtime rates were paid. Various amendments were introduced in the following years. At present the prescribed number of hours of labour for employees in the building industry, including painters, is 44 hours per week, to be worked in five days of eight hours and one day of four hours.

In the next place the report contains a short statement of the application of the provisions of the *Workmen's Compensation Act, 1916*, to the special case of painters and workers in lead. Between April 1, 1919, and November 21, 1920, the certifying surgeon of the Sydney Metropolitan District was called upon to examine twenty persons suffering from lead poisoning, including sixteen house painters. It is held that the number of persons claiming compensation for lead poisoning does not give a true indication of the risks in the occupation involved.

The rate for insurance against compensation risks in painters was fixed in 1910 at 30s. per £100 of the wages paid. In 1917 and again in 1917 the rate was adjusted. It then stood at 20s. until 1920, when it was increased to 26s. 6d..

Some statistical information concerning the health of painters employed in Governmental establishments is given. While lead poisoning has not been observed in any of the servants of the Water and Sewerage Board and very little in the State Railway Department, it would seem that the general health of painters in these branches of the Public Service is less good than that of other workers in the same service. The evidence of the Naval Medical Officer at the Dockyard at Cockatoo Island was to the effect that he had seen only one typical case in close on two years.

Lewis Berger & Sons (Australia), Limited, employ between 70 and 100 men in their lead department. A weekly medical inspection of all men engaged in the manufacture of white lead or in the preparation of lead paints is carried out. The firm claims that in the course of five years one definite case of lead poisoning and one doubtful case occurred among these men, but no case of Bright's disease or pulmonary tuberculosis. It is suggested that the medi-

cal care received by the workers and the hygienic conditions of work render their workers in lead less liable to minor ailments than other workers.

The evidence given concerning the amount of lead poisoning among painters in the various branches of the trade seems to be somewhat indefinite. On the one hand there is the fact that the process of rubbing down involves the raising of considerable amounts of dust. The employers claim that impairment of health is uncommon among house and other painters. The Operative Painters and Decorators' Union find that the reverse is the case. The Board finds it is impossible to form an accurate opinion as to the risks involved in a painter's calling from the information available. The opinions expressed were conflicting and apparently the results of impressions and of an inclination to force an element of partisan colour into an obscure problem.

The Board's Findings.

In the concluding chapter of the report the Board starts out by assuming that white lead is a substantial cause of injury to and death of painters and other workmen engaged in the painting indutry. It is admitted that the average number of deaths from lead poisoning is not great, although the deleterious influence of lead is considerable. The attack rate is unknown as far as painters are concerned. Among the miners at Broken Hill the effects of lead poisoning have been noted in 9% of those exposed to dust containing lead sulphide and oxide. The Board considers that determined action is demanded in the public interest. It is further held that the situation would have to be desperate if the immediate prohibition or restriction of the use of white lead were the only means available to meet the danger. This remedy is not recommended. The claim is made that measures must be applied which will reduce the injurious effect of lead in the painting industries and ultimately prevent it altogether. In the meantime, the damage caused must be measured and all the victims must be adequately compensated. If the regulations aiming at this reduction and ultimate prevention of lead poisoning fail, restriction or prohibition must be substituted. Regulations under the *Factory and Workshop Act* of Great Britain include the introduction of measures for the avoidance or removal of dust or spray containing lead, for the provision of hot water and adequate washing accommodation, for the provision of mess rooms, for the provision of overalls, for the provision of cupboards for the storage of overalls and separate cupboards for outdoor clothing out of reach of lead-containing dust, for the limitation of hours of employment and for the periodical medical examination of workers.

The Board does not feel justified in determining the details of the regulations on which the prevention of lead poisoning should be based. It is held that it should be possible to overcome the difficulties. The control of dust, the institution of medical controls, the suspension from the trade of susceptible persons and of those manifesting signs of early saturnine intoxication, the adequate compensation of all persons affected by lead or other ingredients of paint and so forth suggest themselves to the Board. The experience of the English Act should be regarded and closely followed. It is suggested that a well organized industry, acting as the insurer of the units conducting individual enterprises, settling claims for compensation by the agency of joint committees of employers and employees, aided by a medical department presided over by experts appointed by the Crown, but paid out of the insurance funds, would have every inducement to find means of protecting its funds and its employees at the same time. If a norm of conditions were set up, the variations in the incidence of injury or illness for which compensation would be claimed, would tend to raise or diminish premiums. Under these conditions the penalty of carelessness or of inadequate safeguards would be an inducement for renewed effort. Finally, mention is made of the condition under which men and women are allowed to be employed in the lead industries in England. These include, in addition to the safeguards mentioned above, measures for insuring cleanliness of tools and workshops, the notification of all cases of lead poisoning and the prohibition of the introduction of food or drink into the workrooms.

British Medical Association News.

MEDICO-POLITICAL.

THE following report of the Public Health Sub-Committee of the Queensland Branch of the British Medical Association was submitted on November 4, 1921, to the Commissioner of Public Health (Queensland):

In view of instances of lack of co-operation between the Public Health Department and members of the Queensland Branch of the British Medical Association, the Sub-Committee recommends:

1. That where, in the opinion of a practitioner, a case is one of plague, the Department be requested to assume such case as one of suspected plague, even in the absence of initial bacteriological confirmation and admit, after consultation, to suspect hospital for exhaustive examination. That, in the opinion of the Council, the use of animal inoculation should always be resorted to in cases of doubt.

2. That only the numbers of cases of plague and suspects be announced in the press, without comment or particulars.

Comment.—This course will prevent loss of public confidence in practitioners and the circulation of rumours to their prejudice that plague is being diagnosed on insufficient grounds and for unworthy motives.

3. That a medical officer of the Department be available immediately and at all times for the purpose of consultation.

Further, in view of the continued cases, in spite of the rat campaign, the Sub-Committee recommends that the Department be advised as follows:

4. That access to the whole or such portion of premises deemed to be infective be denied to employees and public until the place is proved flea-free. The following method is recommended: The premises to be sprayed or otherwise cleansed by anti-flea solution and guinea-pigs to be then liberated to pick up such infected fleas as remain and the procedure repeated as often as is necessary to prove the place non-infective.

Comments.—(1) This method was used in one case and no human cases occurred in a building proved infective by guinea-pig test, while one human case in premises known to have harboured plague rats might have been saved by the application of the method. (2) *Vide* the Report of Deputy-Director of Medical Services of the Remount Depôt. (3) The present campaign takes account of rats only and neglects an important link in the chain of infection, *viz.*, the infected flea. It is obvious that plague in humans can be prevented only by breaking this chain of infection and the temporary closure of infected rooms or premises until flea-free seems the only rational method to this end.

5. That premises rendered rat-free be compulsorily rendered rat-proof by structural alterations, etc..

6. That private homes do not require to be publicly quarantined or isolated where it is reasonable to suppose that the infected person has acquired the infection elsewhere. Isolation would more reasonably be applied to the place where the disease was contracted.

The Sub-Committee further recommends:

7. A delegation from the Council to the Commissioner of Public Health be sanctioned to discuss the above. This was agreed to by the Council, the President, Drs. Halford and Duhig being appointed.

It was further suggested that the Home Secretary or the Commissioner be asked to preside over a meeting of merchants and interested persons, for discussion on the lines of paragraphs 4 and 5 of this report.

A resolution passed at the last meeting of the Public Health Association considered such a conference desirable. The duty of asking for this conference will rest with the Queensland Branch of the Public Health Association of Australasia or the Queensland Branch of the British Medical Association.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

DAVIS, NORMAN ERNEST, M.B., Mast. Surg., 1921 (Univ. Sydney), Balmain Hospital.

FURBER, THOMAS MAYNARD, M.B., 1911 (Univ. Sydney), 16, Stanmore Road, Marrickville.

GAHA, JOHN FRANCIS, M.B., Bac. Surg., 1919 (Nat. Univ. Irel.), M.R.C.S. (Eng.), L.R.C.P., 1919 (Lond.), D.P.H. (Trin. Coll., Dubl.), "Omapere," Lane Cove Road, St. Leonards.

LANGDON, JOHN FREDERICK BRITON, M.B., 1919, Mast. Surg., 1920 (Univ. Sydney), "Tresillian," Cronulla.

MCGRIGOR, HENRY JAMES, M.B., Ch.B., D.P.H., 1898 (Univ. Aber.), Carlton Hotel, Sydney.

WALKER, GLAND REAY, M.B., Ch.M., 1921 (Univ. Sydney), Liverpool Road, Croydon.

THE undermentioned have been elected members of the Victorian Branch of the British Medical Association as from January 1, 1922:

DANZIGER, ERNEST, M.B., B.S., 1921 (Univ. Melb.), Warrnambool.

FENTON, GEOFFREY, M.B. *et* Ch.B., 1915 (Univ. Melb.), Armadale.

HALLAM, KEITH HOLLY, M.B., B.S., 1921 (Univ. Melb.), Alfred Hospital, Prahran.

LONGDEN, NORMAN ANDERSON, M.B., B.S., 1921 (Univ. Melb.), Melbourne Hospital.

MACKAY, GEORGE ERIC, M.B., B.S., 1921 (Univ. Melb.), Melbourne Hospital.

SHELTON, JAMES NEWMAN, M.B., B.S., 1921 (Univ. Melb.), St. Vincent's Hospital.

PARER, VINCENT STANISLAUS, M.B., B.S., 1921 (Univ. Melb.), St. Vincent's Hospital.

THE WAR MEMORIAL FUND IN VICTORIA.

THE following have sent contributions to the War Memorial Fund of the Victorian Branch of the British Medical Association: Colin Friend, J. S. Green, R. St. C. Steuart, Frank E. Webb. The amount received is now £26 short of the sum required for the Memorial.

Public Health.

THE PLAGUE OUTBREAK.

BULLETIN NOS. 15 AND 16, which were issued by the Department of Health of the Commonwealth on November 15 and 18, 1921, contain information of which the following is a summary:

General.

The total number of cases of plague in human beings up to November 16, 1921, was 66, including three suspected cases. All the persons affected were in Queensland. The number of infected rodents caught in Queensland up to November 13 totalled 192. One cat was also found to be infected. In New South Wales 25 infected rats were discovered.

It is reported that at a port in Queensland during the supervision of cargo loading an officer of the Health Department detected a hole in a bag of wool. He inserted his hand through the hole and a rat jumped out and escaped. It was further discovered that rats had made a nest in and among some bags of sugar on a wharf. When some of these bags were shifted, eight young rats were discovered. An examination of folded leather revealed that rats had nested in a fold. A rat was noticed to jump from the boat deck of a vessel on to the wharf, a distance of from five to five and a half metres. The rat had apparently been sheltering in a life-boat. These incidents are quoted to demonstrate the need for the strictest attention to duty on the part of supervising and checking officers.

Plague in Man.

During the week ended November 12, 1921, there were three further cases of plague notified in Brisbane. In all cases the diagnosis was confirmed bacteriologicaly. On November 14 two patients suffering from plague died at the Wattlebrae Isolation Hospital and on November 17 a third patient died.

In Townsville there were two further cases during the week. One of the patients had previously been isolated as a suspect. The nature of the disease was determined during the week and the patient died on November 8.

No further infection in human beings occurred during the week at Cairns, but on November 16 a boy, aged 14 years, was removed to isolation on account of an illness proved bacteriologically to be plague.

Smears received on November 7, 1921, from a patient in Toowoomba suspected of plague were found not to contain plague bacilli. Similarly, it was determined that the illness of a patient at Innisfail was not plague.

Plague in Rodents.

During the week ended November 12, 1921, 1,593 rodents were examined and destroyed in Brisbane. Of these, nine rats and two mice were found to be infected. In addition, it was found that one cat out of ten examined was infected.

No infected rodents were reported from Townsville during the week. The examination of smears from rodents taken at Cairns resulted in the discovery of infection in one rat. From Hinchinbrook Shire 108 smears were sent for examination. These disclosed infection in nine rodents from Macknade.

Correspondence.

INTRAVENOUS INJECTIONS OF VACCINE IN ENTERIC FEVER.

SIR: I read with great interest Dr. Fairley's article on the treatment of typhoid fever with intravenous vaccines. I had the opportunity in 1919-1920 of treating a series of cases of typhoid fever by this means at the Broken Hill Hospital and the striking feature of this series was the immediate amelioration of the patient's general condition.

Dr. Fairley has rightly stressed the point that, whether the temperature fall by crisis or lysis, the general condition almost invariably improves after vaccine treatment.

There is no doubt that intravenous vaccines are a distinct advance on any therapeutic measure hitherto recommended in typhoid fever.

Yours, etc.,

GLEN H. BURNELL.

Adelaide, November 14, 1921.

Proceedings of the Australian Medical Boards.

VICTORIA.

THE undermentioned have been registered under the provisions of the *Medical Act, 1915*, as duly qualified medical practitioners:

DANZIGER, ERNEST, M.B., B.S., Melb., 1921, "Kingsmead," St. Kilda Road, Melbourne.

KENNEDY, GERALD JOSEPH, M.B., B.S., Melb., 1921, Cobram.

FLECKER, HUGO, M.B. *et* Ch.M., Sydney, 1908; M.R.C.S., Eng., L.R.C.P., Lond., 1911; F.R.C.S., Edin., 1912, 90, Collins Street, Melbourne.

Name of deceased practitioner removed from the Register:

MCIVER, GORDON JOHN KENNEDY.

Books Received.

THE ORGANS OF INTERNAL SECRETION: THEIR DISEASES AND THERAPEUTIC APPLICATION: A BOOK FOR GENERAL PRACTITIONERS, by Ivo Geikie Cobb, M.D., M.R.C.S.; Third Edition, 1921. London: Baillière, Tindall & Cox; Crown 8vo., pp. 352. Price: 10s. 6d. net.

A TEXT-BOOK OF GYNECOLOGY, by James Young, D.S.O., M.D., F.R.C.S. (Edin.); 1921. London: A. & C. Black, Limited; Crown 8vo., pp. 334, with 183 illustrations. Price: 20s. net.

DOMICILIARY TREATMENT OF TUBERCULOSIS, by F. Rufenacht Walters, M.D., B.S., M.R.C.P. (Lond.), F.R.C.S. (Eng.); 1921. London: Baillière, Tindall & Cox; Demy 8vo., pp. 290, with six charts. Price: 12s. 6d. net.

A GUIDE TO URINARY DISEASES, by Adolphe Abrahams, O.B.E., M.D. (Cantab.), M.R.C.P. (Lond.), and A. Clifford Morson, O.B.E., F.R.C.S. (Eng.); 1921. London: Edward Arnold & Co.; Demy 8vo., pp. 120. Price: 9s. net.

THE HOT SPRINGS OF NEW ZEALAND, by Arthur Stanley Herbert, O.B.E., M.D., B.S. (Lond.); 1921. London: H. K. Lewis & Company, Limited; Demy 8vo., pp. 284, with three maps and 87 illustrations. Price: 15s. net; in paper cover, 14s. net.

THE ADELAIDE UNIVERSITY MANUAL OF PRACTICAL BIOCHEMISTRY, Edited by T. Brailsford Robertson: 1921. Adelaide: The Harvey Book Company; Post 8vo., pp. 70, interleaved, with 12 tables.

LITTLE OBELIA AND THE FURTHER ADVENTURES OF RAGGED BLOSSOM, SNUGGLEPOT AND CUDDLEPIE, by May Gibbs; 1921. Sydney: Angus & Robertson, Limited; Crown 4to., pp. 91, with two full-page coloured and 19 full-page half-tone and several smaller line illustrations. Price: 7s. 6d. net.

Medical Appointments.

THE surgeries of the undermentioned medical practitioners have been appointed places for public vaccination by the Commission of Public Health in Victoria: DR. R. K. BIRNIE (B.M.A.), at Daylesford; DR. W. E. HEWITT (B.M.A.), at Murchison; DR. R. S. WHITFORD (B.M.A.), at Douin; DR. H. N. ZIMMER (B.M.A.), at Mildura.

* * * *

DR. A. E. SHAW (B.M.A.) has been appointed Second Assistant Medical Superintendent, Hospital for the Insane, Goodna, Queensland, on probation.

* * * *

DR. L. M. HUNGERFORD has been appointed at Geraldton, Western Australia, Visitor to the Gaol for the year 1922 under *The Prisons Act, 1903*.

* * * *

THE undermentioned have been appointed Junior Resident Medical Officers, Perth Hospital, Western Australia: DR. J. R. DONALDSON, DR. H. W. FITZPATRICK, DR. G. A. THOMPSON.

* * * *

DR. R. CAMERON (B.M.A.), DR. J. R. LLOYD-JONES and DR. J. L. O'FLYNN (B.M.A.) have been appointed District Medical Officers and Public Vaccinators at Mornington, Norseman and Jarnadup, in Western Australia, respectively.

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DR. F. L. P. SAWELL (B.M.A.) has been appointed Visiting Medical Officer to the Old Men's Home, Claremont, Western Australia.

* * * *

DR. L. G. MALE has been appointed Acting Medical Officer of Health to the Subiaco Municipality, Western Australia.

Medical Appointments Vacant, etc..

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii..

BROKEN HILL AND DISTRICT HOSPITAL: One Senior and Two Junior Resident Medical Officers.

THE MEDICAL JOURNAL OF AUSTRALIA: Assistant Editor.

RED CROSS SANATORIUM, WENTWORTH FALLS: Medical Superintendent.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C..

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney	Australian Natives' Association Ashfield and District Friendly Societies' Dispensary Balmain United Friendly Societies' Dispensary Friendly Society Lodges at Casino Leichhardt and Petersham Dispensary Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney Marrickville United Friendly Societies' Dispensary North Sydney United Friendly Societies People's Prudential Benefit Society Phœnix Mutual Provident Society
VICTORIA: Honorary Secretary, Medical Society Hall, East Melbourne	All Institutes or Medical Dispensaries Australian Prudential Association Proprietary, Limited Manchester Unity Independent Order of Oddfellows Mutual National Provident Club National Provident Association
QUEENSLAND: Honorary Secretary, B. M. A. Building, Adelaide Street, Brisbane	Brisbane United Friendly Society Institute Stannary Hills Hospital
SOUTH AUSTRALIA: Honorary Secretary, 3, North Terrace, Adelaide	Contract Practice Appointments at Renmark Contract Practice Appointments in South Australia
WESTERN AUSTRALIA: Honorary Secretary, 6, Bank of New South Wales Chambers, St. George's Terrace, Perth	All Contract Practice Appointments in Western Australia
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington	Friendly Society Lodges, Wellington, New Zealand

Diary for the Month.

NOV. 29.—Victorian Branch, B.M.A.: Ballot Papers Issued for Election of Office-Bearers.
NOV. 30.—Victorian Branch, B.M.A.: Council.
DEC. 6.—Victorian Branch, B.M.A.: Ballot Papers for Election of Office-Bearers returned.
DEC. 6.—New South Wales Branch, B.M.A.: Ethics Committee.
DEC. 7.—Victorian Branch, B.M.A.: Annual Meeting.
DEC. 8.—Brisbane Hospital Clinical Society.
DEC. 9.—Queensland Branch, B.M.A.: Annual Meeting.
DEC. 9.—New South Wales Branch, B.M.A..
DEC. 9.—Queensland Branch, B.M.A.: Council.
DEC. 9.—South Australian Branch, B.M.A.: Council.
DEC. 13.—Tasmanian Branch, B.M.A.: Meeting.
DEC. 13.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
DEC. 14.—Melbourne Pædiatric Society (Victoria).
DEC. 15.—Victorian Branch, B.M.A.: Council.
DEC. 20.—New South Wales Branch, B.M.A.: Medical Politics Committee; Organization and Science Committee.
DEC. 23.—Queensland Branch, B.M.A.: Council.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)